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Electricity and Steel

Two Great Closely-Knit Industries

WHETHER the steel industry is to be nationalized or not, the recent publication of the British Iron and Steel Federation's scheme of reorganization in the form of a Government White Paper makes it almost certain that this great industry is to be drastically overhauled. The move is long overdue, and the existence for some years past of highly efficient and inefficient production side by side is an indication that the industry's activities have outgrown its structure.

In America steel-making is regarded as the backbone of the national industrial life, and in this country it is generally openly asserted that the electrical industry is the backbone of our national industrial existence. We believe that these two expressions amount to the same thing, because the long and ever-increasing close association between the two industries has led to a point at which the word association hardly depicts the high degree of inter-dependability which has been brought about. It is more like affinity, especially because it is born of manufacturing technique rather than of financial and other considerations.

Mutual Support

We " believe in steel " just as the steel manufacturer " believes in electricity." Peace-time industrial development before the war, after the devastating effects of the depression years, and the more recent wartime developments, have shown that the steel industry has more than maintained its place in the manufacturing world, and with its house put in order it will considerably quicken its pace. The one particular reason for this lies in the continued development of higher and higher quality steel as the result of an outstanding example of co-operation—that between the electrical engineer, the steel manufacturer and the metallurgist.

A Source of Pride

An appreciation of this fundamental fact cannot fail to be a source of pride to any electrical man. Electricity's serious part in this great work started with the installation of the first heavy rolling mill electric drive. The smoother running meant better quality steel. Speed regulation and rolling-mill peak difficulties were overcome by such developments as Ward Leonard control and Ilgner schemes. What a feather in the cap of electrical manufacturers was the development of the special mill motor for steelworks auxiliary drives ! It seemed at one time that it was asking too much of the electric motor to withstand the arduous duties of the steelworks. And no word of praise is too high for the contactor equipment which goes on operating almost without supervision in such close association with these motors. The electrode arc furnace brought further developments in the production of high-grade steels, and these developments were surpassed by the introduction of the high-frequency furnace.

It is not long since we thought of high-grade steel in terms of expensive and special-purpose products, but the point of special significance is that higher-grade steel is more easily machinable steel, and

greater machinability means lower production costs in the subsequent manufacture of steel goods. Continuous cold rolling of sheet steel has of late further advanced machinability by the actual process, so that the pressing of a complete automobile side member in one operation and subjecting a blank to a series of drawings for an intricate object, say, an electric lighting reflector, present no serious difficulties. And the driving, especially the tension control, in connection with continuous cold rolling is an essentially electrical achievement of the highest order. Yes, " we believe in steel "—electric steel.

London Railways

AT present about 60 per cent of the route mileage of railways within the area of the London Passenger Transport Board is electrified. This leaves room for an increase in the mileage by about two-thirds if the recommendations of the Railway (London Plan) Committee are carried out. Since a major proposal is to put the main stations underground and to shorten travelling time, full electrification is essential. Problems of interrunning as between the Southern Railway with its third-rail system and the L.M.S. and L.N.E.R. with their overhead line systems will have to be faced. So too will the change from electric to steam at from twenty to forty miles out of town suggested in the original Greater London Plan, unless main-line railway electrification has by that time made this arrangement an unnecessary inconvenience.

Demonstrators' Salaries

MISS Caroline Haslett stated at last week's conference of the Electrical Association for Women that demonstrators' salaries were now under active consideration by the electrical industry and that it was hoped that it would shortly be possible to announce a recognized scale of salaries. With the assistance of Alderman Sir William Walker the E.A.W. Training and Diploma Committee did produce a scale about ten years ago but this, though followed by some undertakings, has not been generally adopted. Electrical demonstrators are assuming increasing importance as the use of electricity for domestic purposes advances. They not only introduce consumers to electrical apparatus with which they have so far been unacquainted, they also show how individual appliances can be employed most efficiently and economically—a function of particular importance at present in view of the fuel shortage. Generally speaking, the salaries of demonstrators have been inadequate and it is to be hoped, particularly now that the period of their training is to be extended from one to two years, that the proposed scale will remedy this deficiency and accord demonstrators a much-improved status.

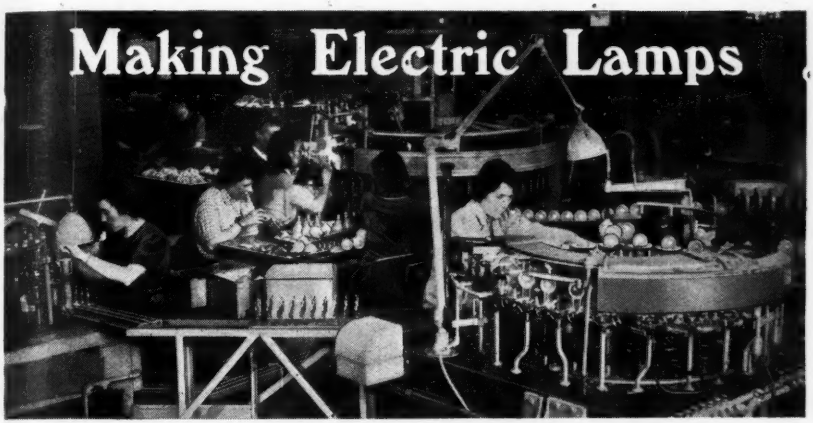
Discount Withdrawals

A MUNICIPAL supply undertaking has raised the question whether the withdrawal of discounts on the prompt payment of electricity bills constitutes a price increase " within the meaning of the Act," thus bringing it within the purview of the Electricity Commissioners. The undertaking concerned has for years given prompt payers what is said to be a " substantial " discount, but the amount is not stated. It is now considering the abandonment of this practice as an alternative to raising prices. The opinion has been expressed that if it was understood that the granting of the discount was merely a temporary arrangement its withdrawal could not be considered to be an increase in price. But the loss of a substantial rebate might be looked upon in this light by the consumers. In any event it is a matter for the Electricity Commissioners to decide.

Physics and Engineering

WITH the recognized need to speed the translation of scientific discovery into technical application and the corresponding tendency to call in the aid of research to institute new lines of production for supplementary traditional methods and making the most of existing resources, the division between physics and electrical engineering becomes less clearly defined. As the electrical engineer requires to be given timely notice of new ideas of the physicist to which he will be expected to give practical shape, so the physicist should have some knowledge of what the engineer can most readily take in hand. Liaison between the two will no doubt be made easier by the decision of the I.E.E. to relax slightly the conditions under which associate membership may be conferred on physicists who have received a defined minimum of engineering training.

Making Electric Lamps



Processes in a Large Factory

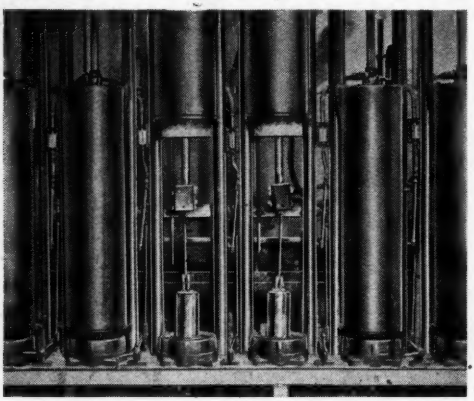
BY the courtesy of the General Electric Co., Ltd., we are able in this article, as the result of a recent visit, to outline the processes involved in the manufacture of standard tungsten-filament lamps, as we saw them carried out recently at the company's works at Wembley. The works comprise two major factories, one being devoted to the manufacture of tungsten and molybdenum in the various forms required for lamps, valves and kindred products, and the other mainly to lamp assembly. Amongst a range of components, glass in the form of bulbs and tubing made also on the same site was dealt with in the *Electrical Review* of March 29th.

Tungstic oxide paste is spread out on steam drying pans, on which it cracks and cakes

Tungsten, which has the highest melting point of any known metal and a density of about 19 compared with a density of 13·6 for mercury, is required for the actual filament, and the first process in the production of this is the decomposition of scheelite (calcium tungstate) in boiling concentrated hydrochloric acid. The resulting crude tungsten oxide is dissolved in ammonia, yielding a solution of ammonium tungstate. After filtering, this is crystallized to ammonium paratungstate. The crystals are dissolved in caustic potash, forming potassium tungstate which, after a period in settling tanks, passes to a precipitation plant. This produces pure tungstic oxide as a continuous process by the admixture of potassium tungstate and hydrochloric acid, the temperatures and rates of flow being controlled precisely.

The tungstic oxide flows in a yellow stream, rather like thin custard, into washing tanks, and it then has to be dried. This is done in three stages—centrifuging, steam drying, and ignition in electric furnaces. The completely dry oxide is ground and sifted through very fine gauze, when it is ready for reduction to tungsten metal powder. This is effected by passing the oxide in iron "boats" through a furnace in a stream of hydrogen with all the conditions carefully controlled. The product is pure tungsten in the form of a dark grey finely

divided powder. The melting point of molybdenum, which is used mainly for the filament supports and for the mandrels upon which the tungsten filaments are coiled, is about 2,600 deg C, and it has a density of 10·2. The preparation of molybdenum resembles in many respects that of tungsten, and similar close control has to be exercised.

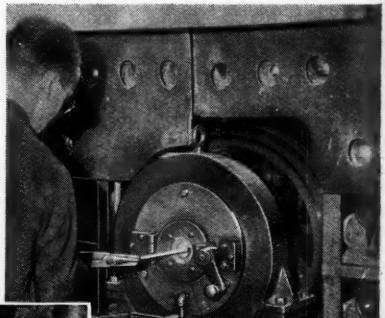


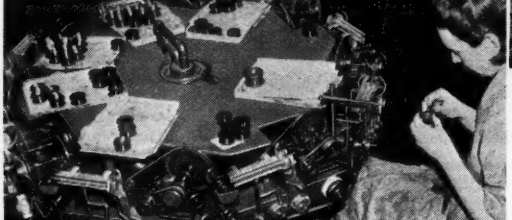
Fragile tungsten bars are sintered by passing 2,800 A through them ; two jars raised to show connections

The refractory nature of both metals makes it necessary to employ rather unusual methods of working. The metal powders have to be pressed into bars which have to be sintered before they are swaged and drawn to the required sizes. Exact weights of powder are first of all placed in steel moulds, and by means of a 200-ton hydraulic press a very fragile rectangular bar is produced which has to be handled with great care.

The sintering operation consists of passing currents of the order of 2,800 A through each bar, thereby raising it to a temperature just below melting point. Each bar is held in water-cooled contacts within a water-cooled jar through which hydrogen is pumped to prevent oxidation. A number of bars are arranged in series and supplied from a special motor-generator set. As a result of sintering the bar shrinks, and assumes a more metallic appearance, but remains very brittle. In swaging, the bar, heated to 1,200–1,500 deg C, is passed between pairs of hammers which strike about 5,000 blows per minute. The bar thus becomes circular in cross-section and more ductile. The diameter of the bar is related to the clearances allowed between the hammers, and the process is repeated until a diameter of just under 2 mm is obtained.

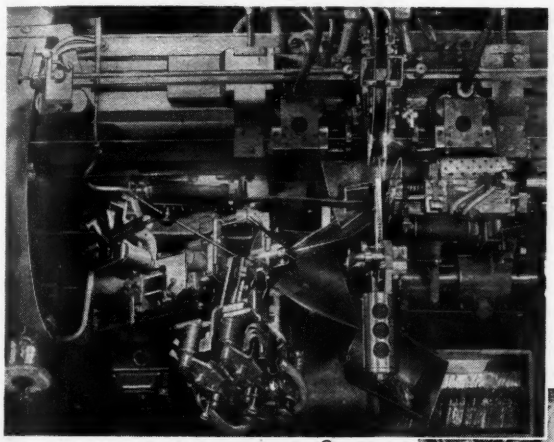
To produce a surface on the material which will facilitate drawing operations the swaged rods are passed through an oxidizing furnace, and into a caustic soda solution in which the oxide film is dissolved. Then follows a very long sequence of wire-drawing reductions with 55 steps, the first of which is effected on a 50-ft long bench, while the final reductions are made on

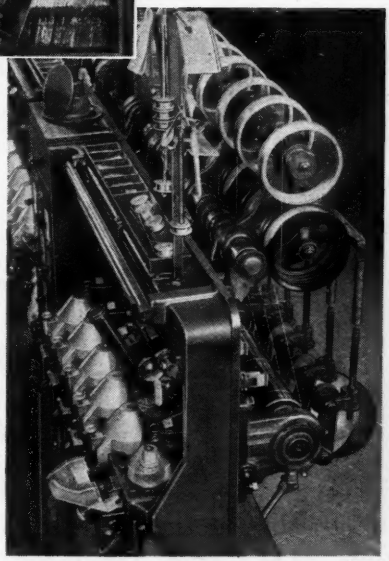




Above : Tungsten bar is made round and more ductile in a swaging machine.
Left : Drawing to the finest sizes is done on tiny machines mounted round rotating tables

tiny machines mounted around rotating tables. The general rate of reduction is about 7 per cent in diameter per step, each giving an increase in length of about 15 per cent. Tungsten-carbide dies are used for the earlier reductions and diamond dies for the later ones. At two stages in the drawing, i.e., 0·17 mm diameter and 0·05 mm diameter, it is necessary to anneal the wire. The smallest tungsten wire used for filaments is 0·01 mm, or about one-third the diameter of a human hair. One bar will yield about 25 miles of filament wire. Such wire is too fine for grading by micrometer, so a known length is weighed on a torsion balance.





Above: Nickel and constantan are brought into line for welding from the right and left, and the copper-clad section is introduced from the front. Right: The mandrel passes from a spool at the top right, over the pitch drum below, to the filament-winding equipment (uncovered) at bottom left. The latter is revolving at 3,000 r.p.m.

The filament wire is now ready for the coiling operation, but a further function of the metals factory is the production of the leading-in wires which connect the cap contacts to the filament. In the case of an ordinary single-coil filament lamp, the leads consist of three parts, namely, a copper outer lead, a copper-clad section through the air-tight pinch, and a nickel inner lead to which the filament is attached. The leads for coil-coiled filament lamps in addition include a constantan fuse. For the copper-clad wire 30 per cent of copper is electrolytically deposited on a nickel-iron core which is then reduced by a series of drawing operations, after which the wire is run through a hot borax solution to prevent oxidation and to facilitate sealing into the glass.

The lead wires are produced on a machine in which the nickel and the constantan are brought into line by tiny arms from the right and the left, so that the inner ends are held in gas jets, and the copper-clad section is then introduced from the front by another arm to fill the gap and to become welded to the other sections at each end. The three-section wire so made is chute-fed to another section below where the copper section is similarly added.

Filaments are produced by coiling tungsten on to steel or molybdenum mandrels and removing the latter by dissolving them in acid. On the filament-winding machine, the mandrel is first passed over a pitch drum by which the speed is so controlled as to correctly space the filament coils, and then it passes through a system of filament-wire carrying rollers which revolve

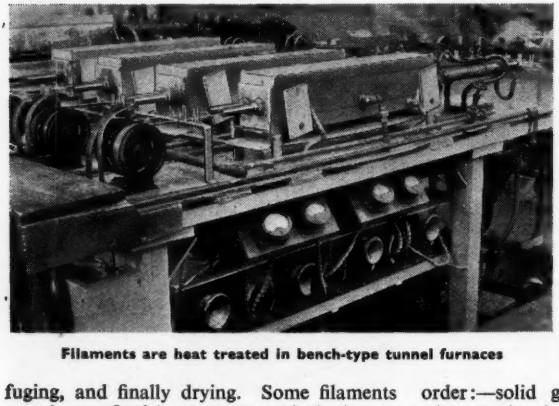
about it and thus wind the filament on to it on the principle of cable-insulating machines. The accuracy required may be appreciated when it is realized that the clearance between turns is only a fraction of the wire diameter, and must be uniform. For example, a "high-voltage" 15-W filament has a clearance between turns of 0·017 mm (0·0007 in.).

The filament wound on the mandrel is then re-coiled on another drum. For coiled-coil lamp filaments, this single-wound mandrel is again wound on another mandrel. The coils, still on the mandrel, are given a heat treatment by passing them through tube furnaces in a stream of hydrogen. The furnaces are wound with molybdenum elements, and various temperatures ranging from 800 to 1,700 deg C, depending upon the type of coil, are employed. It is next necessary to cut the filament coils, still on the mandrels, to the designed lengths. We saw several methods of doing this, one of which carries the mandrel round a central drum on which ride tension pulleys, and through a nozzle from which the end projects over the periphery of a wheel carrying a radial knife which thus cuts one element piece per revolution.

Next the mandrels are removed from the filaments by dissolving them in hydrochloric or nitric-sulphuric acids, depending upon the material used for the mandrel, and then, in turn, washing them in alkali and distilled water, washing, 10 minutes boiling, centrifuging, and finally drying. Some filaments are given a final heat treatment in hydrogen at 1,200 deg C in furnaces similar to those used for heat-treating coils on mandrels. For this purpose the filaments are aligned in "boats" which remain in the hot zone for about six minutes. The coils are examined on an etched glass plate illuminated from below. The coils are checked for accuracy of dimensions, uniformity of pitch and freedom from any mechanical defect.

The remaining processes in the lamp making are nearly all of progressive assembly of the parts we have seen produced. The assembly machines all have work-carrying heads which travel horizontally round the machine, and in many cases during the journey each head revolves individually, with gas jets impinging on the work at required points. All these machines are arranged in a mass-production flow line, and the components are carried from one machine to another by simple conveyors. The first unit of the assembly line is an eight-head flange-making machine in which the lower end of a glass tube is softened, flanged by a rising mandrel, lowered on to a bed, and finally cut by inner and outer wheels which bear on the respective sides of the glass.

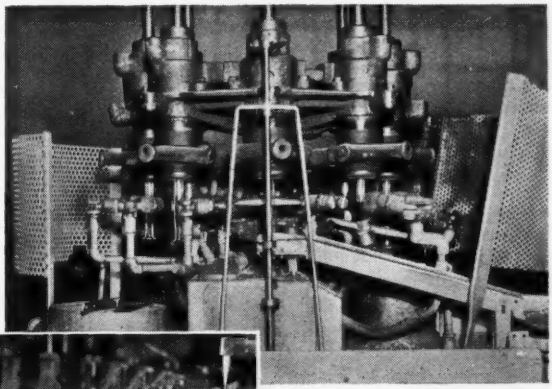
Cutting the filament into lengths by a radial knife on a revolving wheel (guard removed)

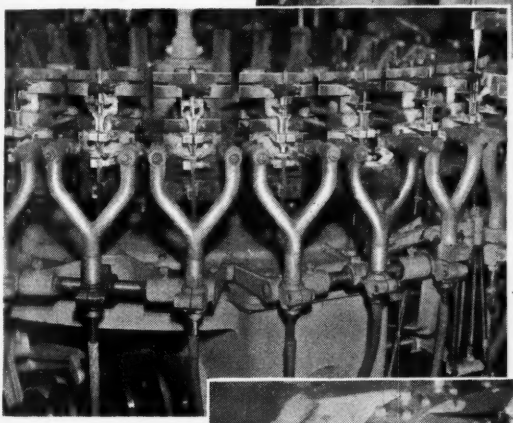


Filaments are heat treated in bench-type tunnel furnaces

The next assembly machine is the foot-making equipment into which the components are fed from left to right in the following order:—solid glass rod, flange, leading-in wires, and exhaust tube. On this 30-head machine all these components are assembled in their correct positions and pinched together at a point where the glass has

been previously melted. The foot is passed through an annealer to prevent residual glass strains, and then the filament is attached on the next machine. Here the filaments are sucked up from a loader on to an anvil which clamps the filament into hooks formed on the nickel component of the leading-in wires. The filament is now screened, whilst gas jets heat up the end of the solid glass rod, ready for the reception of the support wires. These are pushed into the semi-molten bottom of the rod by tiny finger clamps, and the suspended filament is then lifted up and the support wires looped round it.

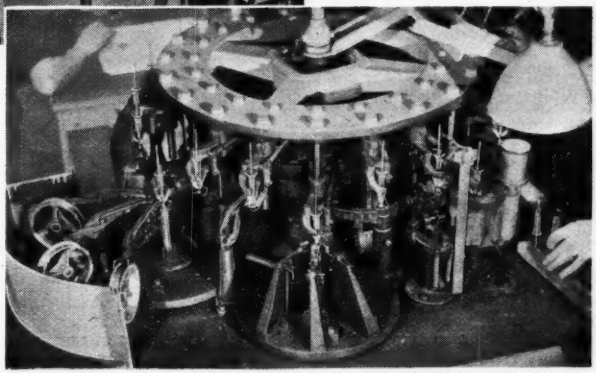




Right : The first assembly machine is an eight-head flange making equipment. Below : Inner components are pinched together where the glass has been previously melted

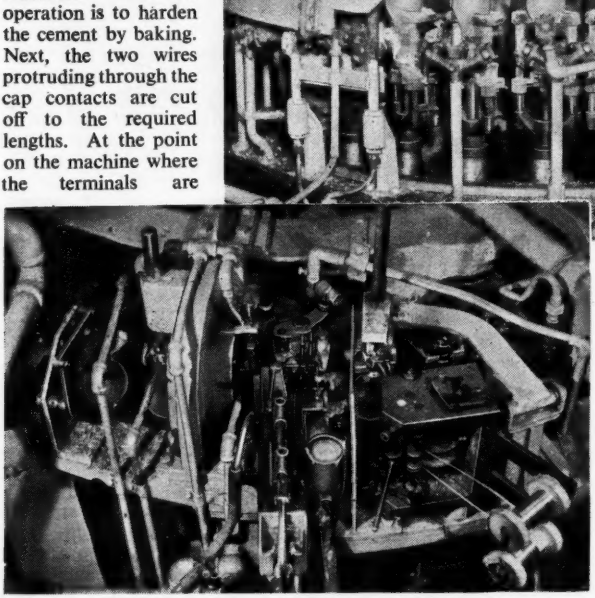
For the next operation, sealing-in, the filament assemblies are placed in the machine heads and a bulb is placed over each assembly. The neck of the bulb and the flange tube are gradually melted together, and the waste end of the bulk neck then falls off. The heat is gradually lessened to prevent cooling too quickly.

The next stages of the process are exhausting and gas-filling, and as the bulbs go round the 30-head machine each is first exhausted, then flushed out a number of times with nitrogen, exhausted again and filled with argon, and the exhaust stem is then sealed off. From the exhaust machine the bulbs pass on to a 48-head capping machine where the brass caps are cemented to the bulbs. Girls



Support wires are pushed into the semi-molten end of the support rod (left): the suspended filament is then lifted up and the support wires looped round it

first thread the copper component of the lead wires through holes in the cap contacts before the lamp is put on the machine. The first operation is to harden the cement by baking. Next, the two wires protruding through the cap contacts are cut off to the required lengths. At the point on the machine where the terminals are soldered two little pads transfer flux from a bath to the cap terminals. In the next position two strips of solder are fed forward over the terminals and two hot irons are lowered, thus soldering the connections.



Above : The neck of the bulb and the flange tube are gradually melted together.
Left : Two little pads pass flux on to the cap terminals and two strips of solder are then fed forward

Whilst still on the capping machine the lamps are lighted for the first time, and an operative then removes them for examination. The lamps are again lighted on another testing machine before being wrapped and boxed and then put on a central conveyor up to a quite independent group of operatives who select samples which are subjected to severe tests, to B.S.S. requirements.

We are indebted for help in producing this article to the staff of the Osram lamp and metals factories.

Grants for Research

ADDRESSING the Parliamentary and Scientific Committee, Sir Edward Appleton, Secretary, Department of Scientific and Industrial Research, mentioned instances of aid to be given by the D.S.I.R. for fundamental research.

A grant of £7,500 over three years and a loan of equipment to the value of £5,000 is to be made to Mr. J. A. Ratcliffe and a team of ten workers at Cambridge University for radio research, including the propagation of very long wave lengths, e.g. 18,000 metres, the emission of wave lengths from natural sources, the exploration of the upper atmosphere with rockets, wave guides and aerials and the development of supersonic technique for application to biology.

Another project is the cosmic-ray investigation of Professor P. M. S. Blackett at Manchester University for which £6,000 will be allowed over three years to provide four senior assistants for four main sections, viz., the development of radar technique for detecting cosmic-ray showers, for measuring the distance of the moon, for cosmic-ray experiments in aircraft and the measurement of high-energy cosmic rays. With a view to providing equipment in advance of that available anywhere else in the world for fundamental research on atomic physics, £141,000 is to be furnished for Professor M. L. Oliphant's work at Birmingham, the aim of which is to attain speeds for electrical particles corresponding to 1,000 million volts. Professor P. I. Dee will receive a grant of £50,000 for Glasgow University.

Views on the News

Reflections on Current Topics

ALTHOUGH the annual Faraday Lecture is intended primarily to appeal to an educated but non-technical public, the audience on each occasion at the local Centres as well as in London has contained a large proportion of electrical engineers who naturally wish to be kept in touch with developments outside their own specialist activities. Those fortunate enough to be included among the 2,000 or so people who filled the Kingsway Hall to capacity last week could not fail to profit by the review of first principles given in Dr. T. E. Allibone's exposition of the modern form of the "atomic theory." In tracing its evolution from Sir J. J. Thomson's separation of the electron to nuclear fission, in which the lecturer himself has taken a leading part, he conveyed an idea of how much is owed to the experimental method of scientific approach as well as how fascinating such demonstrations can be. The large number of disappointed applicants for tickets are to have another opportunity, as Dr. Allibone has consented to repeat the lecture in London at a later date.

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At the invitation of Kelvin, Bottomley & Baird, I recently had the opportunity of seeing their film "Kelvin—Master of Measurement," which has been produced for them by the Film Producers' Guild, whose films made for E.D.A. are already so well known to electrical people. The film is an excellent production and has obviously entailed a great deal of research. The film gives the story of Kelvin's work with special reference, naturally, to his work on navigational instruments and their production by the firm of which he was the founder. I could not help thinking how Lord Kelvin himself would have delighted to see this film and have appreciated the progress in scientific achievement demonstrated.

* * *

From a report in a local paper I note that "a mild breeze" blew up at a recent meeting of the Rugby Town Council. A scheme was submitted for the reorganization of the electricity distribution system at a cost of nearly £113,000, and a member contended that had the Council included two or three practical engineers years ago, money would have been saved, it being clearly impossible for lay members to determine the respective merits of schemes in operation. The Town Clerk described these remarks as quite wrong and averred that those members who were not technical were just as useful as, and in many cases more so than, technical members. He claimed that in one town where there were three electrical engineers on a committee they "made a complete hash of it." The role of "question master" was very ably filled by the Mayor who summed up by saying that technicians, while very useful, did not run the departments; the views of officials must not be subservient to technicians on the committees "who might have bees in their bonnets." I cannot see why the committee-men should be more prone to this apiaristic activity than anyone else, but obviously an impossible situation would arise if they used their technical knowledge in a way that tended to undermine confidence in the judgment of the responsible officers.

* * *

Whatever else may be said on behalf of the nationalization of electricity supply the arguments used in a recent article in the *Daily Herald* by Mr. E. W. Bussey, general secretary of the Electrical Trades Union, against the continued operation of the company undertakings scarcely bear investigation. If the companies' charges for electricity are higher than those of municipal undertakings (and this is by no means always the case) and if they have not always provided "adequate supply" the reason surely is the very much higher costs of supplying the less thickly populated areas which the municipal undertakings generally do not consider worth developing and which are all that are left for the enterprise of the companies.

* * *

If, however, companies "cannot reduce prices in the near future," are municipal authorities in a better position? In any case it is the increased fuel and other costs that provide the cause, not private profits. With regard to the standardization of voltages I should have said that in most cases it is the companies with their generally more recently developed areas that have gone further towards adopting the hitherto accepted standard 230-V supply, and it incidentally is a company, the Northmet Power Co., which has been one of the strongest advocates of the 240-V system which the Electricity Commissioners have just adopted as the future standard. On the matter of charges I have not noticed any very conspicuous differences between companies and municipal authorities in the degree of help provided towards unification of tariffs.

* * *

Sidelight on rationing: "The annual dinner (if any) is left in the chairman's hands."—From a report in the April *Electrical Power Engineer*.—**REFLECTOR**

Faraday Lecture

Dr. Allibone's Review of Atomic Research

THERE was an unusually large audience in the Kingsway Hall, London, to hear the Faraday Lecture in London last week, which is to be repeated later this month at the Institution of Electrical Engineers and has already been delivered at Belfast, Birmingham, Cardiff, Dublin, Leeds, Liverpool, Manchester and Newcastle-upon-Tyne.

DR. E. T. ALLIBONE (head of the Long-Term Research Laboratory just established by Associated Electrical Industries, Ltd.), outlined the development of atomic theory during this century and showed how it was possible to explain very many of the interesting phenomena with which professional electrical engineers had to deal in terms of electrons and nuclei which made up the atoms.

Work of Thomson and Rutherford

The lecturer showed a model of Thomson's conception of the atom based on his experiments with discharge tubes in 1895. Thomson gave the name "electron" to electrically charged particles which were 2,000 times lighter than the lightest particle then known, the atom of hydrogen. But Rutherford, in his famous experiment of 1911, discovered what he called "alpha particles" which he identified as atoms of helium, thrown out of radium with very great energy at a speed 1/30th the velocity of light. Rutherford found that these alpha particles could very easily pass through a thin piece of metal and therefore he deduced that the atom could not be as Sir J. J. Thomson had pictured it, but must be a much more "hollow" thing as the alpha particles could go through it so easily.

Dr. Allibone used cartoon films to illustrate how those particles passed through atoms of copper or aluminium or gold, being deflected only by a very small amount, except in special circumstances. This new theory explained why solid substances behaved in their various manners; why metals conducted electricity; why they omitted electrons in a vacuum and so gave us the radio industry; why they assembled themselves in various forms and so gave us ductile copper and the toughest steel; why light could throw an electron out of an atom and make television possible; and, indeed, why light itself was born.

An explanation was given of the work of Bohr who, at Manchester University just before the last war, elaborated Rutherford's ideas and gave a picture of nearly all the atoms. Three films illustrated a simplified Bohr picture of the hydrogen and helium atoms, also the first metal conductor (lithium) and explained the valency electron which entered into chemical combination with other atoms. It was in this way that Bohr explained the mechanism of chemical combination. (Models of various atoms were exhibited and explained.)

Many non-conducting substances were explained in the same way, such as mica and cellulose; during the war there had been developed a family of substances (silicones) which might help to solve the problem of water absorption by insulating material. By rearrangement the molecules were coated with something like a paraffin wax; which the lecturer demonstrated by experiments, as well as the manner in which plastics were softened by high-frequency heating, for glueing pieces of wood together. Atomic hydrogen welding and the precipitation of dust in the flue gases of large power stations were also dealt with.

Latest Developments

Dr. Allibone explained how nitrogen, as the result of Rutherford's masterly attack on the nucleus, was altered into hydrogen and oxygen and then how, in the Cavendish Laboratory, Cockcroft and Walton smashed the lithium atom and set in motion a decade of nuclear physics, which culminated in the bomb dropped on Hiroshima. The interior of the nucleus was described with the aid of a cartoon film, covering some of the ground dealt with in the recent Kelvin Lecture. An explanation was given of the separation of the light isotope from the heavy isotope—uranium 238—at the large plant installed at Oakbridge, California, for this purpose. The lecturer firmly believed that the enormous energy stored in the nucleus could be harnessed before 1950 to produce high-temperature steam, or for distant heating from central stations, but the general development of atomic energy for industrial purposes would have to wait until the military problem had been solved.

All-Purpose Socket Outlets

Need to Avoid Further Delay

By T. C. Gilbert, A.M.I.E.E.

THE article on "Plugs and Sockets" by Mr. J. F. Field (January 18th issue) and that on "Room Circuits" by Mr. R. H. Rawll (April 19th issue) reflect in no small measure the general unrest and feeling of frustration in installation circles concerning the gravely mishandled all-purpose socket outlet question. This is understandable when it is remembered that Post-War Building Study No. 11 appeared nearly two years ago, and the intervening period has been so inadequately utilized that we now seem to be no nearer our desired objective.

The position is, however, rather more serious than either of the contributors mentioned above has stated. The contractor thinks that it is merely interested opposition that is preventing the official adoption of an already proved all-purpose socket outlet, which has, incidentally, been adopted as standard by no fewer than seventy supply undertakings and is to be made by some of the largest electrical manufacturers. There is clearly nothing whatever to prevent this new socket from becoming available in ever-increasing quantities, and the appearance of a B.S.I.-sponsored pattern in due course will merely add another to the already too lengthy list.

Requirements Already Met

Moreover, some of the largest housing authorities in the country are already installing the new socket and will continue to do so, officially approved standard or no, as independent tests and experience have shown that it can do all that is necessary and meets the full requirements as set out in the Appendix to the report of Study Committee No. 11. The industry does not need another committee to say that it does not really know what it wants, and that it must wait until some of the disinterested members of this committee—Admiralty, the G.P.O., the N.P.L., the Air Ministry, and under this heading might also be included the representatives of E.L.M.A. and C.M.A.—have had their say. It is a matter of wonder that the War Office is not somewhere included in this body.

However that may be, the B.S.I. Committee is not nearly as representative of the affected section of the electrical industry as was the Committee responsible for Post-War Study No. 11. What is being sought is a *domestic* standard all-purpose socket outlet, for ring-main and room circuits, and it is thought that the determination of the type to be adopted could well be left to those concerned with such circuits. This would boil down to representatives of the electricity supply and contracting industries in the main, with perhaps a leavening of manufacturing interests; the I.E.E. and the consulting engineers would be represented in perhaps the same proportion as at present.

Installation Men Not Impressed

As it is, the picture presented is a very different one, and the installation man may be forgiven if he waxes slightly critical of the efforts displayed so far, knowing as he does the intense opposition to any new standard at all. He was not impressed by the last attempt to secure the uprating of the 5-A B.S.I. socket, nor the present determination to introduce a flat-pin standard; he feels that he already has what he wants, and cannot understand what all the trouble is about.

Mr. Rawll is apparently prepared to wait several months for the new official standard to appear, to the detriment of installations waiting to be made to-day. This would be understandable if it were likely to be merely a matter of months, but surely if life tests of the new device are to be taken into account the period of gestation will approach eighteen months or two years, at least. It is certain that the installation industry cannot wait that long, and it will have to be offered much better reasons than have yet been advanced to prevent it from taking advantage of the domestic standard already on the market.

It seems to be assumed, too, that as soon as the new standard appears it will be hailed as satisfactory by all concerned. How can we possibly tell that it may not exhibit some of the defects mentioned by Mr. Field—heating from the fuse and lightness of contact—which may necessitate its return for further study and possibly re-design. It may be confidently stated that if and when it does appear there will be two defects to add to the list; one will be the need for the consumer

to dismantle the plug for the renewal of the fuse, which, incidentally, will give him an opportunity to dismantle the wiring also.

Another probable defect, perhaps not immediately apparent, will be the inadequacy of the fuse if B.S.I. 646 is to be accepted as the standard, which seems to be the case at present. Possibly this point was not made sufficiently clear by the Committee responsible for Post-War Study No. 11, but this new fused plug, which is to be placed literally in the hands of the public in thousands, must be equipped with a high-rupturing-capacity fuse, capable of dealing with prospective currents of 25,000 to 30,000 A at least. It must always be realized that the 30-A main fuse controlling the ring circuit is capable of abuse, and it may well happen that the plug fuse is the only one left between the consumer and the substation.

It seems difficult to design a fused plug with the fuse in the cap that will not exhibit two serious defects—the one mentioned above, entailing the necessity for dismantling the plug for fuse renewal, and the other, rather more serious still, the possibility of bridging the fuse clips with something other than the correct replacement fuse. The industry has suffered sufficiently from the consumer who unknowingly or of malice aforethought up-rates his fuses, but whereas some mitigation of possible results may be expected when the abused fuse is contained in a cast-iron fuseboard located in a remote position, less happy results may be expected if the explosion takes place in the consumer's hand. It seems to be assumed that all consumers have screw-drivers of the correct size for the removal of the plug cap, but in fact few do possess such tools; in that case the replacement fuse will have to be fitted by means of a kitchen knife.

It may be stated quite clearly that the installation industry is looking for something more than just another pin shape in the new all-purpose socket, and its requirements are all clearly set out in the appendix to Post-War Study No. 11. Emphasis will be placed upon para. xii, "It is desirable, if possible, that the new standard socket-outlet should fit into an existing standard type of connecting box." The industry does *not* want any more special boxes, with their quite unrivalled capacity for holding up important installation work, and the new standard will have to fit a standard conduit box, for instance, whether switched or unswitched. It will not be much good a committee's stating that it cannot be done, or is, for some obscure reason, quite undesirable, as it has already been done.

The writer has no interest whatever in the production or sale of the new socket, but he *is* concerned with getting on with the job and cutting out further delay.

High-frequency Apparatus

The Interference Problem

THE increasing use of high-frequency apparatus for industrial heating and electromedical treatment constitutes a grave source of potential interference with telecommunication channels and radio circuits. The subject was debated, as part of the endeavour to establish a basis upon which to formulate a code of practice or, if need be, legislation for mitigating the nuisance, at last month's discussion meeting of the Radio Section of the Institution of Electrical Engineers.

MR. M. R. GAVIN opened the proceedings by explaining how the valve oscillators varied their frequencies and power outputs consequent upon changes of load due to heating cycle needs and medical requirements. Such variation of frequency, when accompanied by appreciable radiation, constituted a real nuisance, but might be minimized by frequency stabilization, or amplitude limitation.

The former method was of limited application, but was worth considering in some cases if a frequency band of the order of ± 1 per cent were available, although it would considerably increase the cost of the equipment. Mr. Gavin therefore recommended, whenever possible, the latter method of suppressing radiation. He urged manufacturers to take immediate steps to determine the magnitudes of the variables involved, to investigate every feasible means of reducing both amplitude and frequency "spread" of radiated energy, and at once develop methods of assessing interference caused by continuous wave oscillators.

The subsequent general discussion emphasized the need for further research to collect data upon which to base a code of practice. If a definite level of tolerable interference were to be specified, it should be several orders of magnitude lower than the 1 mV/M put forward for debate.

There was general agreement that effective screening was more promising than segregation of radio-heating frequencies into restricted bands within which free radiation could be permitted. Very effective screening could be achieved by building factories underground. Instead of the usual wire-mesh screening, a short corridor in the form of a wave-guide might be utilized to cause the necessary attenuation.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

The Man-power Shortage

WITH all this talk about shortage of man-power in the electrical industry, it is difficult to understand the total indifference shown by the Government and industry to the problem of engineers returning from the Forces. Speaking from personal experience, I can say that ex-Servicemen are only too eager and willing to re-enter industry and take part in the programme of rehabilitation. It is very disheartening to find at present time, such neglect of energetic and experienced engineers when there is still so much to be done, getting things back to normal.

I. HERBERT,
Graduate I.E.E.

*London, S.W.*4.

A "Call-up" Plaint

MY experience may prove of interest to electrical engineers of calling-up age in the same position as myself, men who through the war years, have worked day and night to keep running machines vital to the war effort, and, like myself, may soon receive their "calling up" papers.

I am the sole proprietor of an electrical repair business, working exclusively for the electrical trade. I received notice to appear before a medical board last November, and later appeared before a Hardship Board on business grounds. I was granted five months' postponement in order to find somebody to carry on my business during my period of service. I was unsuccessful in this owing to the shortage of men in this branch of the electrical industry. My deferment expired on April 30th and I applied for a further postponement to a Hardship Board on May 9th. I was very officiously handled and my appeal was dismissed after about three minutes' consideration.

During my brief appearance I tried to mention things having a bearing on the case such as letters from various customers stating that I was responsible for the rewinding and maintenance of refrigerators, plant, motors, generators, etc., for factories, power plant and portable tools and equipment (work that is extremely difficult to have done nowadays in reasonable time). I was, however, told to simply answer the questions asked.

Does therefore the decision of the Board mean that I will have no time in which to clear up the financial side of my business, and also the many jobs which are in various stages of repair in my works? In some cases work has been waiting for over twelve months to be completed, owing to lack of materials or replacement parts. Must I inform customers that I will have to return their plant in pieces, which is what the position looks like at the moment?

As a matter of interest, I volunteered for the R.A.F. in 1940, but was told then that my work was of national importance; surely it is of even greater national importance now. And yet at my medical examination I was told that I could be a clerk, driver, or storekeeper, when I have served an apprenticeship as an armature winder/electrical engineer, for five years and have had my own business for a further 5½ years.

Croydon. E. C. HODSON.

Sweden as an Importer

IN your March 1st issue under the heading "Sweden as an Importer," manufacturers who wish to export to Sweden are advised to get into touch with "Elgrossisternas Förening" (Electrical Goods Distributors' Association), Stockholm. This advice surprises us very much indeed, since in peace time imports to Sweden of both electrical and other goods are handled chiefly by Swedish commercial agents. According to an investigation made in 1940, goods to a value of more than 423 million kronor were imported in 1939 through the intermediary of the members of the Federation of Swedish Commission Agents. This was one-third of the total imports into Sweden, if one excludes petrol, coal, motor-cars and ships, which are imported direct by the large concerns in these branches which have world-wide ramifications.

It must be to the interest of every manufacturer to employ the services of an agent for his exports to Sweden. In his capacity of purchaser, a wholesale dealer is not concerned in the interest of any one manufacturer. A commercial agent, on the other hand, is entirely dependent on whether or not his principal's turnover increases. Also, in the event of a conflict arising between seller and

purchaser, the agent is bound by law to take care of his principal's interests in the first place.

The Federation of Swedish Commission Agents, which is the only association of import agents in this country, will supply the names and addresses of suitable agents upon request, and will also insert notices of vacant agencies in its journal free of charge. In the event of foreign firms applying to their countries' legations and consulates in Sweden for the names of suitable agents, their applications are also always forwarded to our Association.

ERIK DÖMY,
Federation of Swedish Agents.
V. Tradgårdsgatan 9, Stockholm.

Unsafe Installations

THREE fatalities through electric shock were reported in your issue of April 26th which were obviously the result of unsafe installations. The few particulars given of a farm fatality leave no doubt in my mind that the wiring left much to be desired. In connection with the death of the two-year-old girl the coroner remarked that the neighbour who installed the cable was an electrical engineer and that had it not been for the insulation of the cable wearing away at a bend of the pipe the fatality would not have happened. Had the conduit been "earthed" in conformity with the I.E.E. Regulations then no fatality would have happened, irrespective of the state of the insulation inside the conduit, as such conditions may arise at any time and the safety measure is in the conduit itself.

In the third case, an Army captain who had survived the risks of war was killed when on demobilization leave because the electric drill which he was using became alive to its framework, which was evidently unearthed. It would not surprise me to learn that a three-core flexible was connected to the drill and that the flexible at the other end, instead of being fitted with a three-pin plug and used on a socket which had an effective earth wire connected, had a two-pin plug or even a b.c. adaptor.

During recent years there has been a tendency for such conditions to increase, and it is time some statutory rules were introduced to ensure that electrical installations are carried out only by skilled workmen and, if the size of the job warrants it, under skilled supervision. A penalty should be enforced for unauthorized extensions, and although most supply undertakings clearly indicate on their application forms that extensions to existing installations should be tested and passed by them, this rule is rarely adhered to, and in many instances it is not enforced. It is not possible, of course, for the supply authority to check all instances, but when unauthorized extensions and connections have been made and discovered a prosecution should result and the necessary publicity given to the case, especially where accidents have resulted. It appears to me the fatalities referred to are instances where some kind of action could have been taken.

Bourne End, Bucks. A. SMITH.

Marconi Exhibition

A DISPLAY of products, arranged to coincide with the International Conference on Radio Aids to Marine Navigation, at the London Exhibition Centre, Wardour Street, W.1 (May 10th to 24th) includes radio telegraph and telephone equipment for land stations and airfields by Marconi's Wireless Telegraph Co., Ltd., and transmitters, receivers and direction finding sets as well as the prototype of a radar outfit specially designed to satisfy the Merchant Navy's requirements by the Marconi International Marine Communication Co., Ltd.

Measuring apparatus made by Marconi Instruments, Ltd., is represented by testing devices for communication equipment and a chronoscope for determining very short intervals of time as for recording the flight of projectiles; also industrial pH equipment for chemical processing, meters for determining the moisture in grain and wood, and others for measuring the thickness of paint or metal deposited on ferrous bases. Included among electro-medical appliances shown are an X-ray dosemeter of the ionization chamber type, a large high-frequency generator for electro-surgery of various forms and short-wave diathermy treatment apparatus.

High-Tension Conference

THE International Conference on High-Tension Electric Systems (C.I.G.R.E.), which was established in 1921 under the auspices of the International Electrotechnical Commission, is to resume its activities after a lapse of seven years. Previously it had been held at two-yearly intervals. Its eleventh session is to take place at Paris from June 27th to July 6th during which time about seventy-five papers will be presented (eleven from the United Kingdom and Dominion engineers) in English and French on the production, transmission and distribution of high-voltage electrical energy. In addition a list of questions for discussion has been drawn up. Those who wish to attend should register as early as possible through their national committee of which in the case of Great Britain, Mr. R. A. MacMahon, 15, Savoy Street, W.C.1, is secretary, Mr. P. V. Hunter being chairman and Dr. S. Whitehead deputy-chairman.

E.A.W. Conference

The Association's Part in Future Electrical Development

THE future of electricity supply and the great opportunities open to the Electrical Association for Women to continue its good work formed the subject of an address by the Minister of Fuel and Power, Mr. Emanuel Shinwell, at a luncheon held last Friday on the occasion of the Association's twenty-fifth annual conference. The function was presided over by the Dowager Lady Swaythling, President of the E.A.W., and among those present were the Minister of Labour and National Service, Mr. G. Isaacs, and the Minister of Town and Country Planning, Mr. L. Silkin.

Mr. Shinwell, Minister of Fuel and Power, the speaker at the E.A.W. lunch. With him is Mrs. M. Wintringham, J.P.

In the twenty-one years during which the Association had been in existence, said Mr. Shinwell, the advance of electricity in many fields, industrial and domestic, had been phenomenal. The domestic consumption of electricity had increased from 300 million kWh in 1920 to no less than 9,400 million kWh in 1946. But there was still a long way to go and they must not rest content until every home in the country, however remote, had its electricity supply. It was not for him to complain of the activities of the supply undertakings and their technicians were worthy of the highest praise for their achievements.

To enable the great task of making electricity generally available throughout the country it was essential, however, to co-ordinate the whole of our electrical activities, both in supply and distribution. Accordingly it was proposed to bring electricity supplies and distribution within the ambit of State ownership and expert technical and administrative direction. He was now engaged on preparing an Electricity Bill but he had given the promise that municipal and private enterprise would be consulted before the Bill reached the House of Commons.

Mr. Shinwell said that it was now proposed to embark on a national housing programme, but it was not as easy as some people thought to supply the necessary labour and materials. They had to provide for the housewife the most efficient and æsthetic fuel appliances and this too hinged on the supply of labour and materials. In this matter of design the Government would appreciate the views of the Association. The needs of the people living in the older houses had also to be considered but priority must be given to the newer houses.

Mr. George Isaacs, Minister of Labour, and Mrs. Shinwell

Mr. J. Eccles, Alderman Mrs. Gregory and Mrs. F. N. Rendell-Baker

There was no advantage to be gained by providing new electrical appliances in the homes unless housewives were told how to use them. Having regard to the fuel shortage he was particularly

anxious that for the next few years attention should be paid to the best use of these appliances. The E.A.W. could help greatly in this direction. The Association was a great annexe to the electrical industry. It had

Miss H. H. Minoprio chats with Capt. J. M. Donaldson

rendered excellent service in the past and it must continue to do so. Lady Swaythling thanked Mr. Shinwell for his address.

At the annual general meeting which preceded the luncheon the annual report was presented by the director, Miss Caroline Haslett, who drew attention to preparations that had been made by the Association for the resumption and expansion of its peacetime functions. After referring to the Association's twenty-first birthday celebrations and the First Women's Electrical Exhibition last November, the director congratulated the branches on having contributed over £1,500 towards the Caroline Haslett Trust Fund for establishing scholarships and travelling exhibitions. As a sequel to the Interim Report giving the E.A.W. point of view on post-war reconstruction, *Housing Digest* was in course of preparation and would present a comprehensive survey of the housing reports issued by Government Departments, women's organizations and other bodies. Home workers' courses had been taken by many different groups and 246 certificates had been awarded during the year. Of 72 entrants for the E.A.W. certificate for demonstrators 51 were successful, 5 gaining distinction. Of 130 entrants for the teachers' examination 104 were successful, 12 gaining distinction.

Proposing the adoption of the report, Mrs. Thwaites (Manchester) made a plea for higher salaries for demonstrators and spoke of the important work done by the Association with regard to housing, planning and smoke abatement. Alderman Mrs. Gregory, hon. treasurer, presenting the accounts drew attention to the fact that there was a balance despite increased expenses.

All members of the National Executive Committee due to retire by rotation were re-elected, and Mrs. Elsie Turner (Manchester and Salford) was elected to fill a vacancy caused by the resignation of Mrs. Scott. Nominations of area representatives for co-option to the National Executive Committee were as follows:—N.W. England and N. Wales, Mrs. H. E. Rhodes (Preston); N.E. England, no nomination; Central England, Mrs. D. Millington (Stafford); Mid East England, Mrs. L. Inglis (Bradford); East England, Mrs. P. E. Rycroft (Gt. Yarmouth); S.E. England, Alderman Mrs. Armitage (Watford); S.W. England and S. Wales, Mrs. L. Dingle (Plymouth); Scotland, Mrs. J. R. L. Wright (Ayrshire).

A resolution was then passed noting with satisfaction that much of the new temporary housing was being electrically equipped but deploring the lack of skilled assistance in facilitating the change over from older methods. The speedy appointment of additional suitably trained women as electrical housecraft advisers was recommended.

Mr. W. J. Jones, Mr. H. Nimmo, Sir Cyril and Lady Hurcomb look for their places at lunch

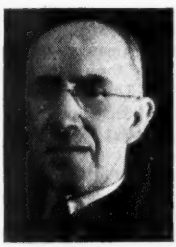
In reply to Miss H. H. Minoprio, Miss Haslett said that salaries of demonstrators were now under active consideration in the industry; she hoped that it would be possible to announce shortly that a scale had been recognized. An announcement would also shortly be made of the extension of the housecraft course from one to two years.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THREE new appointments are announced by the Metropolitan-Vickers Electrical Co., Ltd. **Mr. W. A. Coates,** M.I.E.E., who is to be manager, home sales, was educated at Finsbury Technical College and received practical training with the B.T.H. Co. From 1906 to 1909 he was at Siemens Bros.' Stafford works and from then until 1912 with the British Westinghouse Co. (the M.V. Company's predecessor) on the switchgear side. He became chief engineer of the Canadian Electrical Co. in 1912 and in 1917 returned to the British Westinghouse Co. with whom he held various export department positions. Mr. Coates was appointed chief engineer of the switchgear department of the Metropolitan-Vickers Co. in 1919 and was in charge of the development of the company's first range of metalclad and h.v. outdoor switchgear. In 1922-23 he joined the Metropolitan-Vickers Export Co., serving in Japan and Australia. He was then consulting switchgear engineer to the Metropolitan-Vickers Co. from 1927 until his appointment as sales manager, switchgear department, in 1936.

Mr. Coates is succeeded as sales manager, switchgear, by **Mr. J. P. A. Meldrum,** O.B.E. B.Sc., A.M.I.E.E. Mr. Meldrum, after education



Mr. W. A. Coates

Mr. J. P. A. Meldrum

at Rugby and Glasgow University, served with the Metropolitan-Vickers Co. as an apprentice, and was appointed to the switchgear engineering department staff in 1930. He visited Australia, New Zealand and the United States in 1939, and on the outbreak of war was called up from the Supplementary Reserve and served in the Royal Corps of Signals at home and in France and Belgium, attaining the rank of lieutenant-colonel. He rejoined Metropolitan-Vickers in 1942.

Mr. E. M. Johnson, M.Sc.Tech., M.I.E.E., has been appointed chief engineer of the large electrical machine (plant) department. He is a Manchester man and studied electrical engineering at the Manchester College of Technology. Mr. Johnson became a college apprentice with the British Westinghouse Co. and afterwards held positions in Germany and Switzerland. Since 1920 he has been associated with various branches of the Metropolitan-Vickers Co.'s engineering work. He was for some time in charge of the company's electrical ship propulsion activities and for the past eight years has been responsible for the design of large water-wheel alternators, synchronous condensers and other salient-pole machines.

Mr. E. M. Johnson

Presentations of a photographic enlarging frame and a pewter tankard were made recently by his former staff to **Mr. E. A. Newburn,** engineer and manager of the Walsall Corporation Electricity Supply Department, who has just taken up a similar position at Bath.

Dr. E. T. Allibone, whose Faraday Lecture is reported in this issue, is a past member of the Council of the I.E.E. and has held the position of head of the High Voltage Research Laboratory of the Metropolitan-Vickers Electrical Co., Ltd. He is an honours graduate in physics of the University of Sheffield, and worked for four years at the Cavendish Laboratory under the late Lord Rutherford, developing the application of high voltage to vacuum discharge tubes, etc. Later, at the Metropolitan-Vickers Research Laboratories he studied gas discharge phenomena with reference to modern theories of lighting and the development of high-voltage X-ray apparatus and surge phenomena as appearing in transformers, switchgear, rotary machines, etc., due to lightning. During the war, Dr. Allibone joined the British group of scientists in the University of California working on atomic energy under Professor E. O. Lawrence, specializing in the separation of the isotopes of uranium. He also worked for some time at the separation plant at Oakbridge, Tennessee. He was recently appointed manager of the Long-Term Research Laboratory which has been established by Associated Electrical Industries, Ltd.

Mr. George F. Gregory, A.M.I.Mech.E., M.I.E.E., borough electrical engineer and manager of Ilford, retired on superannuation on April 30th, and his deputy **Mr. Percy E. Smith,** A.M.I.E.E., has been appointed to succeed him. Mr. Gregory entered the Council's service in 1911 as second charge engineer, having previously held an appointment at Darlington. The following year, on appointment as superintendent of mains, he carried out

a very large reorganization and replanning of distribution. He was promoted to chief technical assistant in 1918 and assisted in reorganization of the generating station and later the bulk supply arrangements. He was primarily responsible for the installation of auto-synchronous switchgear at Gantshill, making this one of the first fully-automatic substations in the country. In 1923 Mr. Gregory was appointed deputy to the late Mr. Arthur Shaw, on whose retirement in 1932, he became borough electrical engineer and manager.

Mr. Smith received his training at the Brighton Technical College and with the Reason Manufacturing Co., Ltd. After serving with the Barking, Tynemouth, Hackney, and Ilford Corporations he was appointed sub-station engineer and superintendent at Ilford before being promoted to deputy to Mr. Gregory.

Mr. R. H. Rawll, who has now left Birmingham to take up his appointment as borough electrical engineer and manager at Shoreditch, was presented at a recent meeting of the City of Birmingham Electric Supply Committee with a framed illuminated minute, placing on record the city's appreciation of his services. The chief engineer and manager, Mr. F. W. Lawton, on behalf of the staff of the Department, presented him with a tea set and a leather wallet, and the ex-members of the 72nd L.A.A. Battery, R.A. (T.A.R.) and E Company, 29th Warwicks Bn. Home Guard (both of which units he commanded) gave him an inscribed tankard. He also received a parting gift from the members of the South Midland Centre of the Institution of Electrical Engineers, of which he had been hon. assistant secretary for the last seventeen years.

Mr. B. G. Drummond has been obliged through ill-health to retire from the position of general manager of the East Anglian Electric Supply Co., Ltd., the Bedfordshire, Cambridgeshire and Huntingdonshire Electricity Co., and the Newmarket Electric Light Co., Ltd. He is succeeded by **Mr. H. C. Waters,** formerly assistant general manager of the group. **Mr. H. J. Wright** has been appointed assistant general manager of the East Anglian Co., and **Mr. A. D. Church,** assistant manager of the B.C. & H. Company.

Mr. H. J. Jarratt, who for the past sixteen years has been the chief engineer for Vactric, Ltd., has flown to Australia to organize the new factory being opened in Adelaide by Vactric Electrical Appliances, Ltd., a new associated company. The appointment lasts three years, although Mr. Jarratt may remain in Australia permanently.

Mr. E. V. Cooke has rejoined the Horstmann Gear Co., Ltd., and is now responsible for export sales.

Mr. John Hepburn, having acquired a substantial capital holding in the firm of Musgrave & Co., Ltd., Belfast, heating, ventilating and structural steel engineers, has resigned from the position of managing director of Davidson & Co., Ltd. **Mr. S. E. Innes** also has resigned his position with the Board of Trade to join the board of Musgrave & Co., Ltd.

Mr. A. H. Reeves, A.G.C.I., D.I.C., A.M.I.E.E., who was specially commended by the Minister of Aircraft Production as one of the three scientists responsible for the development of the " Oboe " radar device, has taken up an important appointment with Standard Telecommunication Laboratories, Ltd., research subsidiary of Standard Telephones & Cables, Ltd. Mr. Reeves, who joined the Standard organization in 1923, was responsible for the first short-wave single sideband radio telephone system and was a pioneer in the development of pulse systems for radio telephony. He was also prominently associated with the " micro-ray " experiments made by Standard in 1931 when two-way radio telephony was carried out across the English Channel between St. Margaret's Bay and Blanc Nez on a wavelength of 18 centimetres—the first use of centimetre waves for the transmission of speech.

Mr. A. L. Sutherland has returned to Philips Lamps, Ltd., as manager of the Tungsten Lamp Department. Mr. Sutherland joined the Philips organization in 1933, and when he left to go into the Army in 1940 he was in charge of special lamp sales. In the Royal Artillery he attained the rank of major.

Mr. H. W. C. Griffin, A.M.I.E.E., assistant mains engineer in the Poplar Electricity Department, has been appointed mains superintendent to the Erith Electricity Department. He previously held positions with the Hampstead and Plymouth electricity undertakings.

Mr. W. Norman Hart has been appointed to the board of Kerry's (Great Britain), Ltd., and its subsidiary companies.

Mr. J. H. Dunbar, director of Lancashire Dynamo & Crypto, Ltd., is leaving shortly for a visit to Bepco Canada, Ltd., the company's joint selling organization in Canada. He also hopes to visit the United States and will be away for some weeks.

Lady Swaythling has been re-elected president for 1946-47, with **Mrs. F. N. Rendell-Baker** as chairman, **Mrs. A. B. Lewis** as vice-chairman and **Alderman Mrs. Gregory** as hon. treasurer.

Owing to a re-organization of the distribution side of the Stalybridge, Hyde, Mossley & Dukinfield Transport & Electricity Board, **Mr. F. Mather,** substation and technical engineer for the past eleven years, has been promoted to the position of distribution and technical engineer.

Mr. A. J. Hutchinson, former borough electrical engineer of Farnworth (Lancs), was the guest of the Electricity Bulk Supply Engineers' Association of Lancashire and Cheshire at a luncheon given in his honour at the Grand Hotel, Manchester. During the proceedings a presentation of a salmon rod and reel was made

to him. Mr. Hutchinson has been elected a life associate member of the Incorporated Municipal Electrical Association in recognition of his seventeen years' service on the Council of the Association.

Mr. W. Foster, Parliamentary Secretary to the Minister of Fuel and Power, has resigned. His successor is **Mr. H. Gaitskell, M.P.** for South Leeds.

Mr. J. Ward (Luton) and **Mr. E. F. Schofield** (Harrogate) have been appointed mains assistants in the Blackburn Corporation electricity undertaking.

Mr. Eric Holland, lecturer in electrical engineering at Carlisle Technical College, has tendered his resignation.

Mr. A. B. Macdonald has been elected president and **Mr. W. Paterson** vice-president of the Cumberland sub-branch of the Association of Mining Electrical and Mechanical Engineers at Workington.

York Corporation Electricity Committee has appointed **Mr. J. R. Holding,** of Slough, as charge engineer and **Mr. G. A. Thompson,** installation inspector, as mains assistant.

Mr. J. L. H. Johnson, deputy mains superintendent, South Shields, has been appointed mains superintendent at Nuneaton.

Mr. H. B. Robin Rowell, director of R. & W. Hawthorn Leslie & Co., Ltd., Hebburn, has been elected president of the North-East Coast Institution of Engineers and Shipbuilders.

Mr. and Mrs. A. Butcher, of Lancing, recently celebrated their golden wedding. Mr. Butcher was for many years mains superintendent at Hove.

Mr. F. O. Harber, borough electrical engineer of Bangor, North Wales, is to act in a consultative capacity for the Menai Bridge Urban District Council.

Mr. H. Roberts, consumers' engineer to the Basingstoke Corporation Electricity Department for the past ten years, has been appointed commercial assistant to the Buckrose Light & Power Co., Ltd.

Mr. A. H. Bent, who has been elected chairman of the Wolverhampton Branch of the Institute of Welding, is sales manager, Arc Welding Department of the English Electric Co., Ltd. We regret that his position was incorrectly given in our May 3rd issue.

Mr. E. O. Willoughby has resigned from the radio engineering staff of Standard Telephones & Cables, Ltd., to take up his appointment to the newly created chair of electrical engineering in the University of Adelaide, Australia.

Mr. D. Milner has relinquished the assistant general managership of Liverpool Electric Cable Co., Bootle, a position he has held for the last ten years, to take up another appointment. At a meeting in the factory he was presented with a silver rosebowl and silver cigarette case, the gifts being handed over by Mr. J. T. Frost, works manager.

Mr. W. A. Brown, consumers' engineer at St. Pancras, has retired after fifty years' service with the electricity undertaking.

Obituary

Mr. A. G. Bruty.—Our electrical contractor readers will be sorry to hear of the death, on May 9th, at his home at Greystones, Co. Wicklow, of Mr. Albert George Bruty. Mr. Bruty was principal of A. G. Bruty, Ltd., Dublin, one of the leading Irish electrical contracting concerns, and he was president of the Electrical Contractors' Association in 1935-36. He was born in London and received his technical education at the Regent Street Polytechnic. From 1910 to 1918 he was manager in Dublin for Edmundsons Electricity Corporation, Ltd.; he then set up in business on his own account. Mr. Bruty was a member of the Institution of Electrical Engineers and was a past chairman of the Irish Centre. He had also served as president of the Engineering & Scientific Association of Ireland and as a City & Guilds examiner in electrical installation work.

The late Mr. A. G. Bruty

Dr. S. H. Long.—We deeply regret to announce the death of Dr. Sidney Herbert Long, O.B.E., M.I.E.E., assistant engineer-in-charge of development for Marconi's Wireless Telegraph Co., Ltd., which occurred on May 5th, after a long illness. Dr. Long, who was born at Newcastle-on-Tyne in 1891, read science at Armstrong College, Durham University, of which he was a Fellow, and obtained his D.Sc. for a thesis written as the result of research work undertaken at Göttingen University, Germany, between 1912 and 1914. During the 1914-18 war he served in the Royal Engineers (Signals Branch) as a major and was awarded the O.B.E. At the end of the war he went to India as Officer Commanding No. 2 Wireless Company at Karachi until 1924, when he resigned his commission and joined the technical staff of Siemens Bros. & Co., Ltd., Woolwich. He joined Marconi's in 1929 as technical manager to the Marconi International

The late Dr. S. H. Long

Marine Communication Co. and technical adviser to Marconi's Wireless Telegraph Co. Dr. Long specialized in marine wireless communication and direction finding and he served with the Marconi companies in a number of managerial capacities in the fields of design and development. During the recent war he carried out important work on many secret developments for the Armed Forces, including radar.

Sir Murrough Wilson.—The death has occurred at his home at Piercebridge, near Darlington, of Sir Murrough Wilson, a director of the London Electric Supply Corporation.

Mr. H. W. Firth.—The death is reported, on May 7th, of Mr. Harold William Firth, M.Inst.C.E., formerly chief electrical engineer of the Great Eastern Railway. Mr. Firth was born in 1875 and joined the electrical department of the Great Eastern Railway in 1897. He was appointed chief electrical engineer in 1907 and retired in 1924.

Mrs. A. M. Ackerley.—We are very sorry to learn of the death on May 7th of Mrs. A. M. Ackerley, wife of Mr. R. O. Ackerley, manager of the Illuminating Engineering Department of the General Electric Co., Ltd.

Mr. J. W. Gothard.—The death occurred on May 10th, in his seventy-third year, of Mr. John William Gothard, co-founder of Wilfred Francis & Co., Ltd., electrical engineers, Timperley, Cheshire.

Will.—Mrs. Maude M. Marrvat, widow of Mr. Howard Marryat, who died last November, left estate valued at £46,249.

Sir Thomas Purves to Retire

HAVING entered his seventy-fifth year (though those who know him can hardly believe this), Col. Sir Thomas Fortune Purves, O.B.E., is to retire from the directorship of the Cable Makers' Association shortly, but he will continue to act in an advisory capacity.

Born at Blackadder Mount, Berwickshire, Thomas Purves was educated at the Duns Academy. In 1889, he was appointed in the Telegraph Department of the Post Office at Edinburgh. Studying science at Edinburgh University and at the Heriot Watt College, he won the first medal of the College for proficiency in electricity and technical telegraphy, with the result that in 1892 he was transferred to the Engineering Department of the Post Office, where he made rapid progress.

Sir Thomas Purves

At the outbreak of the 1914–1918 war, he devised many special and novel adaptations of telegraph and telephone apparatus, and took up a commission in the Royal Engineers as liaison officer between the Army Signals and the Post Office. The value of the orders placed for his specially designed items approached two million pounds, and at the end of hostilities he was awarded the O.B.E. (Military Division), and the rank of honorary colonel of the 44th (London Home Counties) Division of the Royal Corps of Signals.

In June 1919, his Post Office progress was resumed by his appointment as assistant engineer-in-chief, and three years later, he became engineer-in-chief in succession to Sir William Noble. Within a year or two his influence upon the practice and policy of the entire Engineering Department had been felt, and his decision to adopt the "Strowger" automatic telephone system was one of the most important decisions ever taken by the Post Office. The development of telephony on an international scale had always interested Colonel Purves strongly, and as chief British representative he attended all the conferences of the C.C.I. (Comité Consultatif International des Communications Téléphoniques à Grande Distance).

In the same year as he received his knighthood (1929), Sir Thomas was elected President of the Institution of Electrical Engineers. The occasion of his inaugural address, dealing with the subject of long-distance telephony, was the first time a "conference" transmission had been arranged, the proposal and seconding of the vote of thanks coming from Manchester and Glasgow respectively. Sir Thomas became an associate of the I.E.E. in 1902; associate member in 1909; full member in 1912. In 1925 he was awarded the Institution's Fahie Premium for his paper on "The Post Office and Automatic Telephones." From 1923 to 1925 he served on the Council, and was vice-president from 1926 to 1928.

Among many other positions which Sir Thomas Purves has held are Assessor to the Advisory Council of the Department of Scientific and Industrial Research from 1920 to 1932 and member of the General Board and of the High Tension Committee of the National Physical Laboratory from 1929 to 1937.

Sir Thomas retired from the position of engineer-in-chief of the Post Office in 1933, having held it for a longer period than any of his predecessors, and he then became managing director of United Telephones, Ltd., until 1936, when on the retirement of Llewelyn B. Atkinson, he was asked to become director of the C.M.A. The good wishes of the whole electrical industry go out to Sir Thomas on his retirement.

I.E.S. Convention

Summaries of Technical Addresses

IN addition to addresses and popular talks the proceedings in London this week of the Illuminating Engineering Society's Convention, which were outlined last week, included six more formal discourses. In the first of them PROFESSOR HAMILTON HARTRIDGE, M.D. spoke of light and vision, indicating recent additions to knowledge of the physiology of the subject.

For example the methods used by Goldmann and Hagan in Switzerland and Sorsby and O'Connor in England depended upon the facts that X-rays were not deflected during transmission through human tissues and that when they impinged upon the retina the latter was caused to fluoresce. Adjustment of a narrow beam so that it coincided with the retina, first on one side of the eye and then on the other, enabled the lateral, vertical and antero-posterior dimensions of the eyeball to be determined. Elaboration of the method rendered it possible to measure the focal length of an eye of normal vision as well as of myopes and hypermetropes.

Colour Vision

The Young trichromatic theory postulated three retinal receptors for colour vision, with red, green and blue responses respectively. But the placing of micro-electrodes, devised by Granit and used by him so brilliantly, in Sweden, on individual fibres of the optic nerve had yielded evidence of eight kinds of receptor: two for red, three for green, two for blue and one for nearly all colours. They had been found in the retinæ of many mammals, but had not yet been proved to exist in the eyes of man.

Assuming the retinal receptors to be arranged according to the laws of chance, then single-type haphazard clusters could be expected; so that at one part of the fovea there might be a small red group, a small green group at a second part and a small blue group at a third part. This cluster theory fitted in with several different observations on vision, such as the high acuity of the eye by coloured lights, the Stiles and Crawford direction effect and the results of micro-stimulation of the human retina.

Ophthalmologists had long been puzzled by the fineness of the definition of the image formed on the retina. The eye lens was composed of simple living refractive media, capable of a performance equal to those of the best photographic and microscopic lenses, which were now known to be largely due to the existence of four nervous mechanisms that "filtered" the nerve impulses on their way from the retina to the brain. They were highly selective, since they suppressed errors due to the aberrations of the eye without causing any observable modification when looking at coloured objects.

Speaking on "New Lamps for Old," MR. L. J. DAVIES recorded the continual striving of designers for more efficient, or convenient, lamps to replace out-dated types. But throughout the "period of incandescence" the main characteristic had been small sources, very bright, without basic change of general method.

The "period of fluorescence" now being entered upon, involved totally different properties, characterized by large areas of low brightness and a wide range of colours. The lecturer amplified his outline with a series of experiments and lantern slides, describing modes of operation at mains voltage and the many lamp and circuit variations likely to be tried.

Solution of Wartime Problems

Different laboratory techniques employed for solving fine representative wartime visibility problems were explained by Messrs. W. R. STEVENS and J. M. WALDRAM. Shrewd appraisal quickly made, was then more valuable than an exact answer, which might take a long time to find; so the authors had favoured an "analysis and synthesis" method.

The physical mechanism was analysed and various factors quantitatively introduced into a simulation of the visual scene (generally on a reduced scale) presented to the observer, who was asked to establish criteria of "visibility," describable but non-scalar. Physical factors were then varied so as to produce physical conditions just complying with the agreed criteria. The parts played by experiment and calculation varied with the problem, interpolation or calculation from experimental results generally being necessary.

Some developments in the lighting of airports to aid night flying were dealt with by

DR. S. ENGLISH, who pointed out that civil and military requirements were not necessarily the same. Therefore civil aviation authorities hesitated to base a standard specification on wartime experience.

The British Standards Institution had accordingly produced an interim guide to airport lighting for civil aviation. The author outlined the salient features of the draft proposals, which would soon be circulated for comment.

Speaking on daylight and town planning from the architectural aspect, MR. W. ALLEN recalled that restriction of the heights of buildings had never been related to any specific standard of daylighting. Wartime investigations of the Building Research Board had established certain principles for the erection of buildings, of cruciform and other equally effective plan-types, in a manner that would admit more daylight to the lower storeys of neighbouring structures, particularly when land was developed in large units.

Fluorescent lighting, according to MR. W. J. JONES (E.L.M.A.), had raised the "ceiling" of practical levels of illumination five-fold. It was likely in course of time to supplant all other kinds of lighting. The use of some 2,500 miles of tubular fluorescent lamps in industry during the war, had not only enabled factory output to be maintained at a high level during the "black-out," but had also saved the nation 100,000 tons of coal per annum.

The author discussed the shadow (diffusion) factor and comparative efficiencies to show that for the same wattage, fluorescent sources furnished much more light than any other means, particularly when limitations of space or bulk enforced a tubular form of lamp. Coloured light was obtainable by fluorescent discharge more efficiently than from filament-filter combinations; a "daylight" colour could be generated six times as efficiently as from filament lamps. The lower temperature of these tubes was of consequence to architects and shopfitters, because less accumulation of dirt within and without the fitting minimized deterioration of appearance and luminous output.

MR. Jones commented on the design of fittings, suggested appropriate diffusing media for general use, emphasized the importance of controlling fittings brightness and discussed Ward Harrison's numerical evaluation of glare, citing the glare ratings of typical installations.

The author stressed the value of fluorescent light for reclaiming commercial floor space to which daylight could not penetrate and stated that it could illuminate underground mines comparably with ordinary street lighting while at the same time reducing brightness contrasts between light source and coal face some 200,000-fold.

PARLIAMENTARY NEWS

By Our Special Reporter

X-ray Rectifying Valves

IN the House of Commons last week, Colonel Stoddart-Scott asked the Minister of Supply if he was aware that there was a shortage of rectifying valves for deep X-ray therapy apparatus; that this shortage was aggravated by too great a proportion of the valves made in this country being exported; and if he would ensure that no apparatus needed for the treatment of cancer was allowed to stand idle for this reason.

Mr. Wilmot said he was not aware of any general shortage of these valves, though there was difficulty in obtaining replacements for apparatus of German manufacture. Only those types of which there was a sufficient supply were being exported.

Poles for Telephones

Major Digby asked the President of the Board of Trade what was the relative priority given to the needs of the Post Office for timber poles for the telephone service and to electricity companies which urgently needed supplies of poles for the extension of electricity supplies to rural areas. Mr. Belcher said that no general distinction of priority was made but available supplies were allocated in consultation with the Departments concerned.

Aids for the Deaf

Mr. Touche asked the President of the Board of Trade if he was aware that some companies had recently increased the price of all hearing aid batteries, but not the standard range of wireless and torch batteries; and, in view of the hardship that this involved on deaf persons, if he would make a statement on the subject. Mr. Belcher said he was informed that this was the first increase in the price of these batteries since before the war, though there had been previous increases in the price of torch and wireless batteries. He had asked the Central Price Regulation Committee to make inquiries into the matter.

Transmission in France

Developments During Past Ten Years

AT the meeting of the Transmission Section of the I.E.E. in London on May 8th, MONSIEUR P. M. J. AILLERET outlined developments that have taken place in the French transmission system during the past ten years. He said that about ten years ago all the French regional systems had just been interconnected through lines and transformers which were relatively weak as compared with the capacity of the various portions of the system thus interlocked; furthermore, the system had not then made use of heavy ring connections. But now the network included several of the latter, which were operated in a permanently closed condition.

The heavy transmission lines now under construction would be operated in a similar manner and they would further increase the number of heavy ring circuits constituting the basic network. Greater homogeneity as a whole had eliminated the serious difficulties with the control of frequency and power which had appeared during the time that the south-east had been interconnected with the Paris region by long stretches of 150-kV lines, whose capacity was inadequate by comparison with the capacity of the terminal networks.

The increasing development of interconnections had had important repercussions on the planning of the associated power stations, which could now be designed on the basis of a common reserve of plant. The problem was to transmit large blocks of power from the southern part of France to the northern parts. The aggregate of 220-kV lines was 2,100 miles and there were 4,250 miles of 150-kV lines; 60 per cent of the power was generated by water, the remaining 40 per cent being steam generated.

Large Sets for Gennevilliers

The Portillon power station, with a head of 4,600 ft, was the first to be freed from carrying its own individual reserve. It had only one penstock, a single unit of 40,000 kW, and a single three-phase transformer feeding a single 150-kV circuit. There was the same tendency to reduce the number of steam sets and to increase their individual power. For instance, two sets of 100,000 kW at 3,000 r.p.m. had been ordered to modernize the Gennevilliers station.

In France it was extremely difficult to estimate future transmission requirements, particularly as regarded the transmission lines themselves. It was necessary to transmit large quantities of power generated by water in the southern half of France and the actual quantity would depend both upon the demand and the desire to reduce to the greatest extent the consumption of coal. If the quantity proved to be very large, 220 kV would not be sufficient. The solution had been, as in the case of a new line between the Massif Central and Paris, the construction of towers capable of carrying one circuit at 400 kV but temporarily carrying two horizontally disposed circuits at 220 kV, providing, eventually, for a capacity about three times that of a 200 kV-circuit.

The 220-kV cable link between Clichy and St. Denis, some 20 km long, had been in operation for about ten years without trouble, except for a repair which had to be made after a third party had severely gashed the cable, permitting leakage of oil. Nevertheless, the cable was operated under voltage until the fault was located. A new oil cable was shortly to be installed which would bring a supply at 220 kV into Paris itself.

Long 220-kV Span

Overhead 220-kV lines at present were all strung on towers in a horizontal arrangement and the spans had been lengthened to an average of 1,600 ft. The conductors (some of steel) were tightly strung, but vibration had occurred only exceptionally and had been easily eliminated by the installation of dampers. There was no reluctance to increase the distance between the towers under favourable conditions. The largest span at present was approximately 1¼-mile at 220 kV in the Alps, provided with normal conductors strung in the usual manner, but spaced 4½ ft apart.

The fairly large distances between substations on the French network had been very favourable to the development of carrier current installations. There were at present telephone interconnections between 366 terminal units, 94 telemetering circuits, and 36 circuits for associated protective equipment; the latter figure would be nearly doubled in the next two years. In addition, two experimental interconnections were being tried to measure the phase angle between distant points of the network for determining more closely, at any instant, the degree of stability of interconnections in a network system. This was specially important during periods of high water when the power stations in the southern half of France desired to transmit the maximum possible quantity of energy to the northern half.

To reduce the time necessary to restore normal interconnection after a breakdown tele-transmission was used to make known to the stations of the disconnected network the frequency and phase (in fact, the voltage vector) of the rest of the network. It was possible to see on a synchronoscope what must be done to bring the two networks into synchronism, even before any operations had been performed on the lines. The time for recoupling networks by this technique had been reduced from some ten to

two and a half minutes. At present they were only ordering switches of 3,500 MVA so as to eliminate progressively from service previous types in areas where short-circuit currents were greatest. Taking into account apparatus at present under construction, the following switches were now operating at 220 kV: large volume oil type 35, small volume oil type 78 and air type 19.

All switches of recent manufacture were designed for high-speed phase-by-phase disconnection as required. The method envisaged, but still in the experimental stage, consisted in re-connection within a very short period (of the order of 100 to 200 milli-seconds only) when necessary for stability, for instance, in the case of a polyphase fault on a line which was not duplicated by other circuits, but in the case of single-phase faults it was preferred to wait a longer time to cover all of the successive possible discharges in a multiple lightning stroke.

For lines firmly connected to the general network, automatic slow re-connection was favoured, carried out even by switches of the old types and having, as the sole objective, restoration as soon as possible after a transient disturbance. A modern network was not sensitive to a single incident; its failures were brought about only by the simultaneous occurrence of a number of abnormalities. Consequently, the less an abnormal situation was allowed to persist, the less risk there would be of a second incident before the network had been re-established to its normal condition.

Operating Principles

It was no longer feasible to talk of the "possibility" of incidents or surges, or of "suitable individual reserve" to stop a given failure. Those concepts had become outmoded through the networks having become so extensive that the laws of statistics now operated. It was necessary to-day to apply the principles of probability in calculating failures of a network.

From this point of view "automatic shedding of load" seemed capable of surviving war conditions. This had been highly developed in France at the time when centres such as Paris found themselves deprived of all reserves of power plant and were obliged to use to full capacity distant sources of supply. Frequency relays had been developed capable of very rapidly cutting out groups of consumers.

MR. H. NIMMO, proposing a vote of thanks to M. Ailleret, said it was always of the greatest interest to hear engineers from other countries speak of the manner in which they had tackled problems similar to those with which we had been confronted, or might be confronted, in this country. When the time came for our grid to be stepped up to a higher voltage, the experience of our French friends would be most valuable.

MR. J. ANDREW LESS seconded the vote of thanks and the PRESIDENT (Dr. P. Dunsheath), supporting it, said that on many occasions in the past members of the Institution visiting France had had reason to be grateful to M. Ailleret for the manner in which he had facilitated visits to works and attendance at conferences, etc.

Cookers for New Houses

Arrangements for Supply Authorities

IN our May 10th issue we published details of the "N.H.D." (National Housing Drive) cooker (or its equivalent) which is being made by a number of leading manufacturers. We have now received from the British Electrical Development Association particulars of the arrangements made for the supply of these cookers.

Requirements will be notified by the local housing authority to the appropriate electricity supply undertaking which will apply a priority symbol and place orders for the precise minimum number of cookers required, stating the monthly rates of delivery. The undertaking must also make a declaration that it has not ordered more than is required by the housing authority. Supply authorities will issue priority symbols for all outstanding housing projects to bring them within the scope of the scheme.

Orders already in hand not bearing priority symbols and new orders of the same kind will take second place to N.H.D. orders but any balance of output in excess of that needed for N.H.D. "blanket" orders may be allocated to "second priority" orders or voluntarily to extra requirements of N.H.D. cookers.

Electrical contractors may refer orders for N.H.D. cookers to the appropriate electricity supply undertaking which, if satisfied that the orders are covered by the authorization given by the local housing authority, will deal with them as with the others.

In collaboration with B.E.A.M.A., the Electrical Development Association has undertaken to act as the channel for advising and co-ordinating detail matters appertaining to the distribution of N.H.D. cookers through the supply authorities and contractors and the N.E.C.T.A., Ltd. (among others) will be kept informed upon the scheme. All complaints arising from distribution will be dealt with by E.D.A. in the first place.

Order of priority of dispatch of the cookers will be as follows:—(i) New housing; (ii) Re-housing (including conversions and war damage); (iii) No means of cooking. The supply undertakings or contractors responsible for distributing the cookers will make their own arrangements for their disposal in accordance with their normal trading practices, i.e., sale, hire-purchase or hire.

The Simplex Electric Co., Ltd., referring to our last week's list, say that in addition to their "R.294" model the "E.295" has also been accepted as a temporary alternative to the N.H.D. cooker. Falk, Stadelmann also state that the reference to their "R.6" cooker should have been "R.646."

COMMERCE and INDUSTRY

Eastbourne Installation Tenders. Employment Trends.

B.I.F. Next May

AT a luncheon last week, Mr. A. Mullins, Comptroller-General of the Export Promotion Department of the Board of Trade, announced that the British Industries Fair will be held next May in London and Birmingham.

Standard Production for Housing

The Building Centre has undertaken to organize the technical information service in connection with an Exhibition of Standard Production for Housing which is to be held at the Princes Galleries, Piccadilly, W.1, from approximately June 12th to July 27th. Information is now being sought which will enable the Building Centre Bureau to give details of sources of supply, names of manufacturers who are making products and equipment in accordance with British Standards, together with availability and any other details which may be required by local authorities and all concerned in housing. This information service will be continued at the Building Centre after the exhibition is closed. Further details of the services to be offered can be obtained from the Director, Building Centre, 9, Conduit Street, London, W.1.

Flush Type Tumbler Switches

Flush-type one-way single-pole tumbler-switches rated at 5 A at 250 V, complete with switch-boxes and switch plates, are dealt with in BS.1299, which supersedes relative parts of BS.816. The new specification includes constructional requirements, tests for electrical and mechanical endurance and for current carrying capacity. Dimensions are prescribed to facilitate interchangeability of switches of different makes in standard boxes. It is proposed to issue further parts of this specification covering surface type switches and switches of 15 A capacity in due course. Copies can be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s.

Scottish Fuel Research Station?

The Government is being asked to establish a fuel research station in Scotland similar to that at Greenwich, to which all Scottish firms send fuel-burning appliances and equipment for examination and approval.

Tenders for Electrical Installations

The Ministry of Health recently informed the Eastbourne Housing Committee that, as at present advised, the Minister was not prepared to give approval to tenders submitted for electrical installations. The letter pointed out that when the original negotiated price for the construction of the houses on the site was revised the prime cost item in respect of electrical installations was increased, but the tenders now submitted were higher than the increased prime cost figure and compared unfavourably with figures submitted to the Ministry from other areas. It was suggested that efforts should be made to secure other tenders, if necessary from firms outside the county borough. The town clerk reported that certain firms outside Eastbourne were invited to submit tenders for the work, but on the advertised closing date none had done so; four days after the closing date a tender was received but was not considered. The Ministry had been asked if its technical adviser on electrical matters could visit Eastbourne to discuss the question.

Visit to Tufnol Works

As one of several visits planned to co-ordinate the work of the civic, university and industrial activities of Birmingham, the Lord Mayor, Alderman A. S. Giles, O.B.E., M.C., J.P., visited the works of George Ellison, Ltd., and Tufnol, Ltd., on May 8th. With him were the Lady Mayoress and members of the civic

Mr. George Ellison demonstrates to the Lord Mayor of Birmingham the strength of Tufnol

administration and University staff. The party was received by Mr. George Ellison, sales director, and conducted round by Messrs. George Ellison (governing director), T. G. Ellison, J. Ellison and A. E. Skan (directors). In the switchgear works the progressive stages of manufacture were followed and sections of a heavy current switchboard in course of construction for a new Midlands power station were seen.

Electrical Employment

The total number employed in the electrical engineering industry in Great Britain in February was 153,300 (including 52,300 women) compared with 153,000 (52,900 women) in January, according to a survey in the April *Ministry of Labour Gazette*. In mid-1945 and mid-1939 the figures were 175,800 (69,700 women) and 133,900 (28,000 women), respectively.

In the electrical wiring and contracting industry 44,300 were employed in February, 43,300 in January, 37,500 in mid-1945 and

41,700 in mid-1939. The number of women employed in February was 5,400 compared with 2,800 in 1939.

There was a fall on the month in the number employed in electrical apparatus and cable manufacture, the figure for February being 236,900 (123,100 women) compared with 239,800 (127,000 women) in January. In mid-1945 the total was 279,900 (167,700 women) and in mid-1939 it was 195,900 (79,500 women).

Electricity supply is grouped with gas and water, the total number employed in the three industries in February being 193,300 (26,800 women), compared with 186,900 (27,500 women) in January, 166,600 (28,400 women) in mid-1945 and 214,800 (11,600 women) in mid-1939.

Unemployment in the electrical engineering industry in Great Britain showed a further rise from 2,877 (including 1,035 women) on February 11th to 2,937 (1,052 women) on March 11th. For electrical wiring and contracting the figures were 495 (81 women) in February and 563 (83 women) in March; and for electrical apparatus, cable, lamps, etc., 3,653 (2,031 women) in February and 3,608 (1,949 women) in March. In the gas, water and electricity supply industries there were 1,918 (373 women) unemployed in February and 2,047 (454 women) in March.

Matching Men with Jobs

As a result of research and practical experiment, the Appointments Department of the Ministry of Labour and National Service has put into operation a new method of classifying vacancies and assessing applicants which, it is believed, will help considerably in matching men with jobs.

Refrigerator Spares Depot

A new depot solely for the supply of refrigerator spares has been opened by King's Refrigeration Supplies Co. (Frig Spares, Ltd.) at 22, Middle Street, London, E.C.1. Nearly

Display of refrigerator components at the new spares depot of King's Refrigerator Supplies Co.

4,000 components and accessories of both British and American machines are listed. Supplies of components for American apparatus, being subject to quota restrictions, are very limited, and no licence has been obtained to import complete compressors. A permanent display of typical components has been arranged at the trade counter.

Sussex Industries Exhibition

The light engineering, electrical and radio trades will be fully represented at the Sussex Industries Exhibition to be held in the Corn Exchange, Brighton, to-morrow, till May 25th. The main objects of the exhibition are to give wide publicity to Sussex products and the value to the county of maintaining a live industrial background. Visitors will see attractive displays of new ideas in industry, specimens of light engineering production, lighting and heating, refrigeration, radio and labour-saving kitchen equipment.

Transformers for Finland

Ferranti, Ltd., have secured an important order for Finland against international competition. The order covers two three-phase transformers stepping up 64,000 kVA from 115 kV to 230 kV which are the first three-phase units of the 220-kV class ordered in Great Britain. There is in addition a third winding, rated at 32,000 kVA, for connection to a 10·5-kV synchronous reactor. The transformers are being built for the Imatra Power Co., Finland, for installation at the Pyhakoski power station as a link between the existing 110-kV grid system and a new 220-kV main transmission line running from the water power region in the north to supply the industrial load of the south.

Gauge & Tool Makers' Association

The Gauge and Tool Makers' Association is arranging a trade luncheon at the Savoy Hotel, London, on June 19th (12.30 for 1 p.m.). The guest of honour and chief speaker will be Sir Frederick Handley Page, C.B.E., managing director of Handley Page, Ltd.

Fifty directors of member firms are participating in a four-day visit to Paris which is being organized by the Association. The party is leaving London on May 24th, to be in Paris for the opening of the International Fair on the following day; it will return to London on May 28th.

Electricity Supply Industry Holidays

Under an agreement made by the National Joint Industrial Council for the Electricity Supply Industry qualified day workers, after twelve months' service, are to be allowed an annual holiday of two consecutive weeks with pay during the holiday period. They are also to be allowed a holiday with pay for the normal working hours on public holidays. Day workers who are not qualified but who on April 1st had completed six months' continuous service are to receive one week's holiday with pay during the holiday period and a holiday with pay on three of the public holidays. Double time is to be paid for work on a public holiday on which a day worker is entitled to a holiday with pay.

Shift workers, after twelve months' service, are to receive an annual holiday of three weeks with pay, including two consecutive weeks during

the holiday period. Shift workers who are not qualified but who had completed six months' service on April 1st, will be entitled to one week's holiday during the holiday period and three other days. All payments to shift workers under this agreement are to be at the shift rate.

The agreement, which is deemed to have come into operation on April 1st last, also provides for holidays or payment in lieu in the case of employees leaving the service of undertakings; payment of allowance for holidays to personal representatives of deceased employees; qualification for holidays of employees returning from the Forces; sick pay and entitlement to further holidays at the convenience of the undertaking where an employee is ill during the normal holidays; and cancellation of certain district enhanced payments.

Trade Publications

Optical Measuring Tools, Ltd., Montrose Avenue, Slough, Bucks.—Illustrated brochure containing detailed working instructions for the horizontal "Omtimeter," an optical comparitor of internal diameters and gaps and of "outside" measurements of plugs and rods.

Thomas Bolton & Sons, Ltd., Widnes, Lancs.—Illustrated 36-page "Spirax"-bound booklet (No. 107) on phosphor bronze wire, sheets, sections, machined parts, etc., with information about their uses, chemical compositions, physical properties and forms in which each alloy is available; also leaflet (No. 118) on chill cast phosphor bronze and gunmetal, solid and cored bars, with tabulated data.

Wardle Engineering Co., Ltd., Old Trafford, Manchester, 16.—Illustrated and priced brochure (No. 332/1) on projectors containing sodium discharge lamps for flare-path illumination on airfields, or the floodlighting of buildings.

Murex, Ltd., Rainham, Essex.—Two booklets respectively naming metallurgical and chemical products used by the electrical, radio, welding and other industries and giving standard specifications with typical analyses of metals, alloys, powders and metallic carbides.

E. H. Jones (Machine Tools), Ltd., Edgware Road, The Hyde, London, N.W.9.—Illustrated coloured brochure on Newall jig boring machines.

Applicants for copies of these publications should write on their firms' business notepaper.

Swedish Import Market

From the Federation of Swedish Wholesale Merchants & Importers we have received an illustrated booklet dealing with Sweden as a market for foreign goods. It shows that the country is one with excellent purchasing power anxious to resume as soon as possible its commercial relations with former suppliers and customers. In 1938 goods to a total value of £122 million were imported of which machinery, apparatus and electrical materials accounted for about £12 million. Great Britain was second to Germany in the list of suppliers and there now exists a good opportunity of securing first place. The booklet contains some useful information on the financial and economic situation in Sweden. The British representative of the Federation is Capt. C. Thompson Walker, Crescent House, Ilkley.

New Liverpool Metrovick Premises

The Metropolitan-Vickers Electrical Co., has opened new premises at 58-60 Paradise Street, Liverpool. As the building is in the centre of a badly bombed part of the city the windows are a war casualty, but the company hopes some day to restore them to their plate-glass elegance.

New Metropolitan-Vickers premises at Liverpool

English Electric Exhibition at Birmingham

Alderman Lt.-Col. H. A. Sale, M.C., J.P., chairman of the City of Birmingham Electric Supply Committee is to open an "English Electric Activities Exhibition" which is to be held at the Chamber of Commerce Buildings, 95, New Street, Birmingham, 2, from May 23rd to June 1st.

Dissolutions of Partnership

McClure & Whitfield.—The partnership hitherto carried on by McClure & Whitfield as electrical manufacturers and contractors at Mersey Dynamo Works, Stockport, and at Bramhall and Macclesfield has been dissolved. The business of electrical manufacturers previously carried on at Mersey Dynamo Works will be continued by Mr. David McClure and the business of outside electrical contractors previously carried on at Stockport, Bramhall and Macclesfield will be continued by Mr. C. W. Piggott and Mr. J. N. Whitfield under the style of "Piggott & Whitfield."

The Cheshire Refrigerator Supply & Service Co.—Messrs. F. Smales and E. D. Mitchell, refrigeration and electrical engineers, 27, Liscard

Village, Wallasey, trading under the above title, have dissolved partnership. Mr. Smales will carry on the business.

Gullett & Sugden.—Messrs. J. T. Gullett and G. Sugden, electrical contractors, 14, Fair Road, Wibsey, Bradford, have dissolved partnership. Mr. Gullett will attend to debts.

Deaf-aid Appliance Batteries

The Treasury has made the Purchase Tax (Exemptions) (No. 2) Order, 1946, exempting from purchase tax batteries of not less than 15 V and not more than 45 V specially designed for deaf aid appliances and using layer type cells not exceeding 6 mm in thickness with zinc elements of which each face does not exceed 500 sq mm. The exemption applies only to goods which are delivered on sale, or appropriated to retail trade or similar purposes, on or after May 20th, 1946, or, in the case of imported goods, which are entered with the Customs or delivered from bonded warehouse for home consumption on or after that date.

Ayrshire Contractors

The inaugural dinner of the new Ayrshire branch of the Electrical Contractors' Association of Scotland took place at Irvine following the business meeting at which the status of a full branch was officially granted. Mr. W. Findlay Nelson was elected chairman; Mr. S. R. Philips, vice-chairman; and Mr. H. Kerr Baillie, C.A., secretary and treasurer. An address was given by Mr. Walter Finlay, W.S., consultant and solicitor to the Association. In introducing him, the Chairman paid tribute to the work done by Mr. Finlay for the Association during forty-two years. Mr. Finlay said he hoped that national registration was not a too-far-distant reality.

Contract Price Adjustment Formulæ

The latest figures for the B.E.A.M.A. contract price adjustment formulæ are as follows: Rates of pay for adult male labour at May 11th, 103s. (same). Costs of material: the index figure for intermediate products last published by the Board of Trade on May 11th is 191·1 and is the figure for the month of April (compared with 190·2 for March).

Leicester Lighting Exhibition

An exhibition of Lighting and Colour in Industry is to be opened by Mr. J. W. Belcher, Parliamentary Secretary to the Board of Trade, next Wednesday at Wolseys, Ltd., Abbey Park Mills, Leicester. Though intended mainly for the hosiery industry it will illustrate many points of much wider application.

Trade Announcements

Mr. E. L. Edwards, associated with the Plessey organization for eighteen years, and Mr. G. A. Upton, export manager with Marconiphone, Ltd., chief buyer to A. C. Cossor, Ltd., and latterly on liaison work for the Plessey Company, have now resigned and started their own organization under the title of Edstone, Ltd., 41, Spenser Street, London, S.W.1 (telephone: Victoria 8220). The company aims at undertaking sole representation of manufacturers in Great Britain and the export development of radio and electrical products. The company will also act as buying agents in Great Britain for overseas concerns.

H. J. Golding & Co., Ltd., electrical wholesale distributors, 138-138a, Plough Road, Clapham Junction, have acquired adjoining premises to meet increased business requirements, and their trade counter and offices have been moved to 138, Plough Road. Mr. A. L. Standish and Mr. F. Balk have returned from the Forces to take charge of sales and despatch departments.

As from June 1st the head office and showrooms of the Jackson Electric Stove Co., Ltd., at 143, Sloane Street, S.W.1, will be closed on Saturdays with the exception of a small staff to take urgent telephone messages.

The telephone number of the new B.T.H. Birmingham district office at 8, John Bright Street, Birmingham 1, is Midland 6335.

The Mercantile Credit Co. of Ireland, Ltd., informs us that it has recently commenced operating at 29, Clare Street, Dublin. Its services include the medium- and long-term financing of hire-purchase and other methods of buying industrial and domestic equipment.

Delco-Remy & Hyatt, Ltd., inform us that they are now working a five-day week. This applies to the sales and administrative departments as well as to the works in London and Dunstable.

J. & R. Wade, Ltd., electrical wholesalers, have opened a depot at 11, Castle Street, King's Road, Southsea, Portsmouth.

Leonard Toomer & Co., Ltd., have moved to 65, Moorgate, London, E.C.1 (telephone: Monarch 3821).

W. H. Price, Ltd., have moved to 18-21, Stafford Street, Birmingham.

Elliott Bros. (London), Ltd., have opened offices at 72, Victoria Street, Westminster, London, S.W.1 (telephone: Victoria 6093/4).

Mr. S. H. Parsonage, A.M.I.E.E., 42, Pall Mall, S.W.1, has been appointed agent for the Thermostatic Controls Co., Hampton, Middx.

National Chamber of Trade Conference

Over forty subjects, many of them of vital concern to retailers in all trades, are being discussed at this year's Trade Conference of the National Chamber of Trade which opens at Scarborough on Monday.

TRADE MARKS

THE following applications have been received for the registration of trade marks. Objections may be entered within a month from May 8th:—

DEREN (design). No. 636, 704, Class 9. Cam-operated contactor controllers; unbreakable grid resistances; slider pattern rheostats and resistances; welding rheostats; circuit breakers; overload relays and magnetic contactors; all being electrical goods.—De Renzi, Holmes & Co., Ltd., Fox's Lane, Wolverhampton.

ROTALAC (design). No. 638,015, Class 9. Insulated wires (electric), and cables for electric transmission systems.—Rotalac, Ltd., Bridgewater Works, Timperley, Ches.

ARICONTROL (design). No. 638,531, Class 9. Temperature regulators.—Accurate Controls, Ltd., Windsor House, 46, Victoria Street, London, S.W.1.

RECENT INTRODUCTIONS

Notes on New Electrical and Allied Products

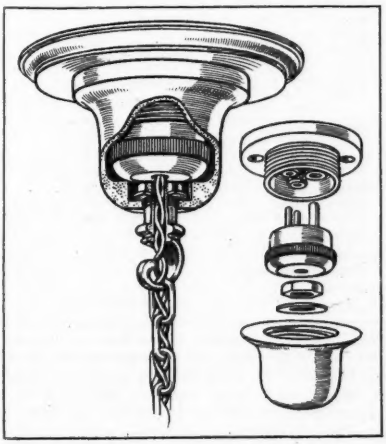
Floor Polisher

ONE of the first British post-war floor polishers is now being manufactured by VACTRIC, LTD., 7, Park Lane, London, W.1, which has sold £500,000 worth of vacuum cleaners to the U.S.A. The polisher has three brushes. Two revolve in a clockwise direction, the third is anti-clockwise. They are changed by simply depressing ejector pins on the outside of the base. The weight of the cleaner renders it easy to control and its triangular base makes corners simple to clean. A special rubber buffer prevents skirting boards from being marked. The motor is of the universal type with self-lubricating ball bearings.

Floor polisher with easily removable brushes

Novel Ceiling Rose

A ceiling rose of unusual design, to simplify wiring, has been introduced by "GREGG" ELECTRICAL PRODUCTIONS, 3, Ring Mill, Brinksway, Stockport. It is a moulded product in three parts. The circular base, which can be screwed to the wood block or conduit box in the usual way, is really a socket outlet, polarized, with provision for earthing and clearly marked. Into it is inserted a three-pin plug with an entry for flexible connectors at the centre of its cover which forms a cord grip. The overall cover is similar externally to that of the usual rose, but it differs internally in that two shoulders are moulded inside; one of them prevents withdrawal of the three-pin plug while the other sustains the weight of the tube or chain suspended fitting. Thus all kinds of lighting fittings become interchangeable, they can easily be taken down without tools for cleaning, while installation contractors can wire fittings in advance ready to be simply plugged-in on site.



A universal plug-in socket ceiling rose

Vacuum Cleaner

Reintroduction of the "Bustler" suction cleaner is announced by VACUUMS, LTD., Aldridge Road, Birmingham, 22B. The most noticeable difference from the pre-war model is the fitting of a three-core flexible connection cable. The machine is of the stick type, its total weight with all attachments and seven yards of connector cable being only 10½ lb. The long handle is very easily removed so that the machine may be employed single-handed for cleaning upholstered furniture, staircase carpets, the inside of motor cars and wherever space is restricted.

Elco reflector fire

Reflector Fire

In addition to soldering irons and boiling rings, ELCO (TREFOREST), LTD., Treforest Trading Estate, near Cardiff, is now marketing a 1-kW reflector fire of attractive design. It has neat sides made of die-cast aluminium either in natural finish or blue, green or gold. A wound spiral type of element is used, special precautions being taken to avoid sagging, and an exceptionally strong guard is fitted. A 2-kW model will also be available by next winter.

Heater-boiler Combination

A multi-purpose heater which can be utilized as a radiator, toaster, or pot-boiler has been named "Nippyette" by THERMIONIC PRODUCTS, LTD., Pratt Walk, London, S.E.11. The 650-W open wire element is accommodated in a grooved refractory former mounted in a steel frame with bakelite feet. The wire guard is adjustable for simmering food.

Electrical Trade of Peru

United States Secures Lion's Share

PERU'S total imports of electrical goods and apparatus in 1944 were valued at 14,036,000 soles, compared with 13,425,000 in 1943 (£1 = about 26 soles). The principal supplier, as for many years, was the United States with 11,541,000 soles (against 10,274,000). Second position was taken by Argentina with 883,000 soles (796,000), which thus held the advance made in 1941. Switzerland took the place held for two or three years by Canada as third largest supplier. From the accompanying table it will be seen that the main increases were in radio goods, low candle-power lamps and vacuum cleaners. In other domestic appliances there were decreases, as also in high candle-power lamps, switchgear, and wires and cables. The demand for electrical installation material was stimulated by building activity in Lima, Callao and other centres during the past two or three years and at times shortages occurred. More recently house-building received a check through Government action to curb speculation and safeguard the conservation of land for food production. According to the Bank of London and South America the Central Reserve Bank has improved its position during recent months in respect of foreign currency holdings, and import permits are being granted on a fairly generous scale, with exchange cover readily forthcoming on receipt of the relative permit.

Class.	1944 Soles (000)	Inc. or dec. on 1943 Soles (000)
Switches, circuit-breakers, etc.	1,246	+ 242
From Argentina	151	− 147
„ United States	845	+ 269
„ Great Britain	8	− 27
„ Canada	4	− 2
„ Brazil	105	+ 83
Batteries and accumulators	1,121	+ 516
From Canada	12	+ 12
„ United States	740	+ 154
„ Great Britain	3	+ 3
„ Argentina	364	+ 347
Insulators	218	− 44
From United States	23	+ 16
„ Argentina	8	− 21
Insulated wire and cable up to 3 mm.	980	− 304
From United States	940	+ 26
„ Canada	33	+ 20
Covered copper wire over 3 mm. diam.	566	− 726
From United States	433	− 213
„ Canada	95	+ 16
Wire and cable, lead-covered	861	+ 414
From United States	846	+ 648
„ Canada	25	+ 25
Flex, covered with fabric	109	− 78
From United States	82	+ 9
„ Brazil	26	− 182
Copper wire over 3 mm. diam., lead-covered	566	− 726
From United States	433	− 212
Wire, insulated or uninsulated, lead-covered or armoured	234	− 66
From United States	162	− 138
„ Canada	72	+ 72
Telephone cable, lead-covered	136	− 18
From United States	135	+ 79
„ Canada	1	− 68
Telephone apparatus	209	− 36
From Argentina	6	− 4
„ United States	186	− 33
„ Great Britain	8	− 5
Radio apparatus	2,049	+ 91
From Argentina	2	− 75
„ Great Britain	3	− 2
„ United States	2,013	+ 860
„ Switzerland	12	—
Radio valves	165	+ 28
From Great Britain	20	− 32
„ United States	145	+ 71

Class.	1944 Soles (000)	Inc. or dec. on 1943 Soles (000)
Heating apparatus over 10 kg., including industrial	88	− 37
From United States	72	− 20
„ Argentina	16	− 16
Household heating apparatus, not over 10 kg.	101	− 34
From United States	21	− 15
„ Switzerland	7	+ 7
„ Argentina	69	− 30
Ammeters, galvanometers, etc.	194	+ 68
From United States	162	+ 51
„ Switzerland	25	+ 13
Switchboards	1,265	+ 491
From United States	993	+ 280
„ Canada	130	+ 130
„ Switzerland	133	+ 85
Lamps up to 50 W	837	+ 195
From Brazil	3	+ 2
„ United States	829	+ 190
Lamps, 50 to 200 W	248	− 192
From United States	244	− 194
„ Great Britain	4	+ 3
*Lamps over 200 W**	87	− 55
*Torches**	22	+ 8
House meters	154	− 23
From Switzerland	148	+ 89
„ United States	6	− 6
Current transformers over 1 kW and rectifiers over 3 A	532	− 148
From United States	383	− 177
„ Switzerland	143	+ 117
Vacuum cleaners, etc.	206	+ 182
From United States	103	+ 79
„ Sweden	103	+ 103
Insulating tubes	61	− 10
From United States	55	− 9
„ Canada	3	+ 3
*Fans**	32	+ 7
Refrigerators	239	− 185
From Sweden	119	+ 119
„ United States	114	− 307
*Fractional H.P. motors**	66	− 33
Dynamos and spare parts	364	+ 183
From United States	363	+ 198

* Mainly from United States.

ELECTRICITY SUPPLY

Norwich Prepayment System. Acquisition of Scottish Undertakings.

Ashford.—EXTENSIONS.—The Urban District Council is to supply electricity to Lacton Manor farm, Westwell, and three adjoining cottages (£700). Mains extensions are to be carried out in the Christchurch Road (£958) and Taylorland, Smarden, districts (£1,855), and supplies to the hospital at Willesborough are to be improved.

Barrow-in-Furness. — SUBSTATIONS. — The Corporation Electricity Committee is to provide substations at Amphitrite Street and Roose at a cost of £17,505 and reconstruct the 6·6-kV switchgear in substations (£10,435).

Birkenhead. — LIGHTING CONVERSION. — The Watch Committee is to commence the change-over from gas to electric street lighting in the northern area.

Birmingham.—STREET LIGHTING RESTRICTED. —Lighting on minor roads has been discontinued for four months because of the serious shortage of gas mantles and electric lamps.

Bolton.—POWER STATION EXTENSIONS.—The Electricity Committee has approved a revised scheme for extensions at the power station and is seeking sanction to borrow £101,800 for the buildings and plant.

Cardiff.—CONVERSION OF GAS INSTALLATIONS. —In view of increased costs the Housing Committee has increased the additional rental charge of 2d. per week in perpetuity for the conversion of gas installations to electricity to 4d., per week but has agreed to discontinue this charge as soon as the conversion cost has been paid.

Chesterfield.—FRINGE ORDER.—The Corporation Electricity Committee is to seek a Fringe Order to supply houses in Temple Normanton, the cost of which is estimated at £4,727.

LOANS.—Sanction has been obtained to borrow £2,245 for supply to Wasp Nest brickworks and £40,600 for mains services and meters.

CLOTHES DRYING UNITS.—The Corporation Housing Committee is to equip permanent houses now in course of construction with electrically heated clothes drying cabinets, the heating units costing £2 3s. each.

Eastbourne. — SUPPLY DEVELOPMENTS.—The Electricity Committee is to extend mains and substation plant in the Victoria Drive area (£2,790), increase the capacity of the Gaudick Road substation and replace cable (£1,140), modernize equipment at the pier substation (£1,145), and extend cables to supply houses at Polegate and Hailsham (£629). Sanction is being sought to borrow £10,000 for mains and services and £5,000 for substation equipment.

Eston.—SUPPLY TO DOCKS.—The Electricity Committee has decided to negotiate with the Tees Conservancy Commissioners and the North Eastern Electric Supply Co., Ltd., regarding the provision of an electricity supply to new docks to be constructed by the Conservancy Commissioners.

Hereford.—HIRE AND HIRE-PURCHASE.—The Corporation Housing Committee is to offer tenants on the Hunterton estate the following alternative arrangements in respect of cookers and wash-boilers: Hire, 1s. per week, the Corporation being responsible for maintenance; hire-purchase, 2s. per week, the Corporation to be responsible for maintenance and the apparatus to become the property of the tenants after five years.

Lichfield.—FACTORY SUPPLY.—The Electricity Committee is to prepare a scheme for supplying electricity to a new factory to be built by Hill Bros. at Shenstone.

North-East Durham.—FUTURE OF ELECTRICITY SUPPLY.—A meeting of local authorities has decided that local councils within the area of the South Shields Rural Electric Lighting Order, 1903, and the Sunderland District Electric Lighting Order, 1904, should apply for another extension by one year of the time allowed for the authorities to purchase the electricity undertakings in their areas. A proposal, already approved by Sunderland Town Council, for a joint electricity authority for the area is to be considered by the individual councils.

Norwich.—SUPPLIES TO NEW HOUSES.—The question of supplies to new Council houses received consideration at a recent meeting of the Electricity Committee. The city electrical engineer (Mr. J. A. Sumner) suggested that wherever possible the minimum electrical equipment for a Council house should consist of a cooker, wash-boiler, 1½-gallon sink water heater, hand operated immersion heater in the hot water tank and an electric kettle. The Committee decided that Council house consumers should have the opportunity of having this apparatus installed under a special system of charging which the engineer recommended.

This system is similar to that adopted by certain other undertakings before the war and assumes that the average annual consumption will be 3,000 kWh. The annual charges for the apparatus have been added to the standard running charge on the domestic two-part tariff, and result in an average price per kWh of approximately 1·3d. A straight prepayment meter will be installed capable of being varied by steps of ½d. and the meter will be calibrated originally at a price of 1½d. per kWh (the assessment charge will continue to be collected with the rent). At the end of each year the number of kWh will be ascertained and the meter will then be recalibrated on the basis of the two-part tariff curve which results from the combination of the annual apparatus charge, plus the standard running charge.

Salford.—REVISION OF RATING ASSESSMENT.— The City Council has given directions for £57,645 repayment of rates in respect of the electricity undertaking, as the result of the revision of the rating assessment for the financial years 1942-46. This sum is to be placed to the credit of the electricity renewals fund.

Scotland.—BOARD ACQUIRES UNDERTAKINGS. —To mark agreements for the acquisition by the North of Scotland Hydro-Electric Board of the electricity undertakings at Rothesay and Kirkwall, Mr. Tom Johnston (chairman) and other

members of the Board last week visited the two burghs. The undertakings, which are the first to be acquired by the Board, are being taken over as from May 15th.

Addressing Rothesay Town Council and Bute County Council, Mr. Johnston said that the Town Council had greatly facilitated matters by agreeing to transfer its undertaking, and the town would reap the benefits of this farsightedness and public spirit in the shape of lower charges for electricity. In practically all cases the Board's tariff would be lower than that previously charged.

Contracts had already been let for the erection of some of the distribution lines in the island of Bute. Until the winter of 1948 the electricity would be supplied from a Diesel engine power station at Rothesay, which would then be supplemented and finally superseded by a supply from the hydro-electric station at Loch Striven, which formed the Board's Constructional Scheme No. 4. It was hoped that when hydro-electric power was available a further reduction in charges might be possible. Speaking of the advantages of electricity to farmers, he said that arrangements had been made to carry out an experiment in hay drying on a farm just outside Rothesay. In Bute there were about 90 farms and in all but about sixteen cases the supply would be brought to them free of charge. Free connections would also be given to the great majority of houses and cottages in the island. Hire-purchase arrangements would be available to cover wiring costs and the purchase of electrical apparatus. He congratulated the Marquis of Bute upon his decision to make no charge for wayleaves and to do everything possible to facilitate the provision of this great amenity to the homes of his tenants.

Mr. Johnston announced that it had been agreed for the Board to acquire the works of the Arran Electricity Co. next autumn (subject to the Electricity Commissioners' consent). Bute was therefore likely to be the first county in Scotland in which the electricity supply would be completely operated by the Board.

Sunderland.—COOKERS AND WASH BOILERS.—The Town Council has applied for sanction to borrow £8,782 for the purchase of 401 electric cookers and a similar number of electric wash boilers for new council houses.

TRANSPORT

Australia.—N.S.W. SCHEME.—The New South Wales Cabinet has approved extensions to the Metropolitan electric railway system costing about £25,000,000. Work will begin immediately and last about seven years.—*Reuter.*

Glasgow.—TROLLEY-BUS EXPERIMENT.—Tenders are to be invited for the construction of twenty trolley-buses for an experimental service between Polmadie and Provanmill. If successful, the service will be extended to King's Park and Robroyston. Two substations required will cost £39,000, the total cost of the experiment being estimated at £125,000.

Sweden.—BERGSLAGSBANAN ELECTRIFICATION.—Completion of the electrification of Sweden's biggest private railway, the 570-kilometre Bergslagsbanan (mining area line) which runs from Göteborg to Dalarna and Gävle, was celebrated by a trip by a special "inaugural train." The conversion from coal to electricity, has cost 39 million kronor, but the operating costs will be substantially lowered. According to one of the company's technical experts, the inaugural train consumed electricity to a value of 300 kronor for the trip from Gävle to Göteborg, while the corresponding cost by steam would have been 3,000 kronor. An important consideration is that electric traction will save 80,000 tons of coal a year. In addition to ordinary express trains, special small express train sets with a speed of 120 km.p.h. will be put into service this summer.

Switzerland. — NEW LOCOMOTIVE. — Orders have been placed by the Swiss Federal Railways for sixteen electric locomotives of a new type that can negotiate sharp curves at high speed. The Re 4/4, as the new locomotive is called, weighs only 56 tons as against the 94 tons of the fastest type hitherto in service, but it develops 2,635 H.P. and can maintain a speed of 80 m.p.h. pulling ten or twelve all-steel coaches. A communication corridor at one side running the full length of the Re 4/4 enables the locomotive to be inserted in the middle of the train and passengers can thus walk through the locomotive itself. It is expected that by the end of this year most of the light-weight interurban expresses will be running at an average of 80 miles per hour.—*Reuter.*

Forthcoming Events

Saturday, May 18th.—*London.*—I.E.E. London Students' Section. 9.30 a.m. Visit to C.E.B. Central Control Room, Southwark.

Connaught Rooms, Great Queen Street, 1 for 1.30 p.m. Junior Institution of Engineers. Annual luncheon.

Leeds. — Electricity Department Offices, Whitehall Road, 2.30 p.m. I.E.E. North Midland Students' Section. Luncheon, annual general meeting and film afternoon.

Manchester.—Engineers' Club, Albert Square, 3 p.m. Association of Supervising Electrical Engineers (Manchester Branch). Annual report, by R. H. L. Andrew.

Wednesday, May 22nd.—*London.*—Institution of Electrical Engineers, 7 p.m. I.E.E. London Students' Section. Annual general meeting and sound film.

Thursday, May 23rd.—*London.*—Connaught Rooms, Kingsway, 10 a.m. Electrical Wholesalers' Federation. Annual general meeting.

Friday, May 24th.—*London.*—Institution of Electrical Engineers, 5.30 p.m. I.E.E. Measurements Section. "Measurement of Time," by Sir Harold Spencer Jones.

21, Albemarle Street, W.1, 5.15 p.m. Royal Institution. "X-ray Analysis in Research and Practice To-day," by Sir Lawrence Bragg.

Saturday, May 25th.—*Bath.*—Forum Cinema, 3.30 p.m. I.E.E. Bristol Students' Section. Annual general meeting.

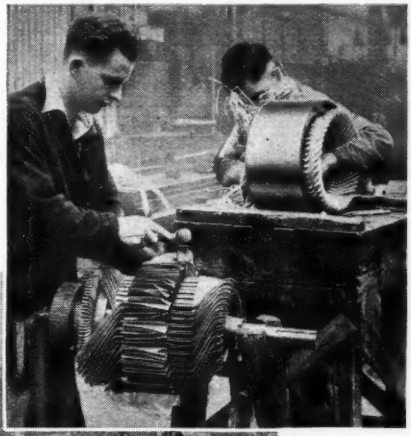
Tuesday, May 28th.—*London.*—School of Tropical Medicine, Gower Street, 7 p.m. Society of Instrument Technology. "The Design of Automatic and Manually Operated Control Systems," by Dr. A. Porter.

Coventry.—Electricity Showrooms, Corporation Street, 6 p.m. Coventry Electric Club. Annual general meeting.

Electrical Craftsmanship

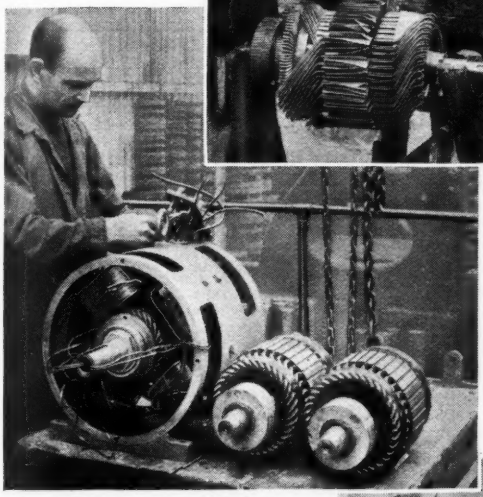
Specialized Production of a Scottish Concern

WITH the mass production of standardized types of equipment so widespread nowadays, it is refreshing sometimes to visit a works where the manufacture of special electrical apparatus still requires a high degree of craftsmanship by almost all the workpeople employed. Such a factory is that of the Macfarlane Engineering Co., Ltd., at Cathcart, where the company, with Mr. J. C. Macfarlane, the founder, as managing director, has in the past thirty-six years built up a reputation for all types of special rotary electrical apparatus, including equipment for laboratory and research work, up to 400 H.P.



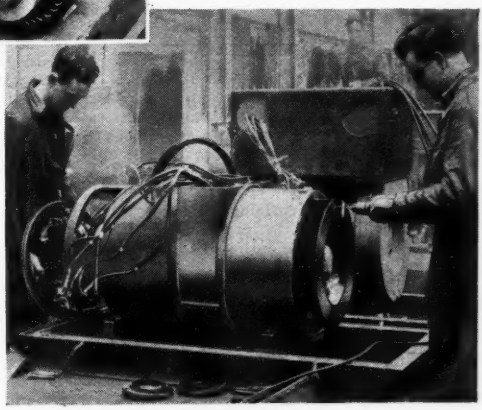
Making a tropical-proofed armature for an arc welding plant and (behind) an a.c. stator for a standard welding set

Among what may be described as the "least unstandard" apparatus made are motor-alternator sets incorporating dynamometer fittings having novel quick de-coupling features; auto-synchronous motor-generators; double spring balance swinging field type dynamometers; small precision electro-dynamometers; rotary convertors, including a tandem type with phase displacement device, also with rapid de-coupling facilities; screen-protected motors; series Hopkinson testing sets; sine-wave alternators; vertical spindle pipe-ventilated squirrel-cage motors and special universal a.c. motors. The last-mentioned item is particularly interesting since it has been supplied with as many as nine



Above: Fitting the terminal box to a 6-ring rotary convertor for Glasgow Technical College. With it are two rotors for sine-wave alternators in course of construction.

Right: Assembling a 20-kW motor generator for stud welding



rotors, any one of which can be replaced by another within three minutes.

A considerable amount of work has been done in connection with the production of constant voltage generators which need no voltage-regulating equipment and 27½-kVA self-regulating alternators supplied during the war for lighting and power installations for jungle use give voltage constant to ±2½ per cent. Variable-speed constant-voltage apparatus up to 15 kW has also been made in quantity for marine purposes, while other war work has included thousands of step-by-step motors for searchlight control gear, 22-kW searchlight generators, and, it is claimed, half of all the rotary welding plant made in this country.

More recently electrical gear employing the constant-current system has been supplied for dock capstans, and experiments are now in hand on developing motors specially suitable for use in battery electric vehicles. As a development of the auto-synchronous motor a power-factor correction unit has been produced and a 150-H.P. dynamometer for testing Diesel engines up to 3,000 r.p.m. has been installed recently in the Glasgow Corporation's transport depot. Apart from large numbers of welding sets, including several for stud welding, we saw in course of construction at the works a batch of tropically designed machines ordered by oil companies for arc welding purposes. During the war the labour problems in coil and conductor insulating were partially solved by about fifty married women undertaking the work in their own houses.

Nile Irrigation Barrage

Remodelling Scheme

THE remodelling of the irrigation barrage on the River Nile at Esna in Upper Egypt has involved the use of a large proportion of electric drives for many purposes and an extensive lighting installation for night working, necessitating the provision of central generating plant and a power distribution network. Precautions had to be taken against failure of supply, since the remodelling has to proceed to a rigid schedule in limited time during low river periods between floods. The remodelling was designed by Sir Murdoch MacDonald & Partners, consulting engineers to the Reservoirs Department of the Egyptian Government. The work is now being carried out by Sir Lindsay Parkinson & Co., Ltd., the sole sub-contractors for the electric power scheme being Crompton Parkinson, Ltd. Primary distribution at 3,300 V is unusual for this kind of work; there is now an installed step-down transformer capacity of 1,800 kVA. The power-house contains six oil engines: three by W. H. Allen, Sons & Co., each of 311 B.H.P., and three of Paxman-Ricardo make each of 206 B.H.P., driving at 600 r.p.m. Crompton 3·3-kV alternators of 200 and 140 kW respectively. There are smaller engines for air compressors and pumps and a d.c. battery charging set. The ten-unit switchboard is of the "Klad A" type, the manually operated 300-A breakers being rated at 25 MVA. There is a separate six-panel exciter control desk in which a regulator is incorporated for automatically adjusting voltage after the alternators have been paralleled, to minimize the risk of overheating electrical plant in the high ambient temperatures prevailing.

One step-down transformer of 300 kVA is in the power house and the others (all by the B.E.T. Co.) of 500 kVA are in kiosk substations mounted on buttresses on top of the barrage, together with incoming 3,300-V oil breakers and 440-V metalclad distribution boards comprising switch-fuse gear controlling outgoing circuits to individual pumps, air compressors, a ten-way sub-distribution board for concrete mixers, a travelling crane and floodlighting circuits.

Most of the motors are working in the open, being either totally enclosed or otherwise protected and fed through three-core t.r.s. flexible cables. Distribution to the buildings and yards as well as for outdoor lighting is by p.b.j. conductors carried overhead on 120 galvanized sectional steel "Adastra" poles made by Poles, Ltd.

Ladder-type Networks

Formulæ in Scottish Paper

NEW transmission-line formulæ are introduced in a contribution by Major W. E. Bruges to the *Proceedings* of the Royal Society of Edinburgh, which has recently been published at 2s. by Oliver & Boyd, 98, Great Russell Street, London, W.C.1.

In this the evaluation and application of certain ladder-type networks is discussed and in one notable formula line losses are deduced from the load and leakage currents. The paper also seeks to replace A. B. Field's paper (A.I.E.E. 1905) in which the resistance losses of a slotted conductor are given. In the present paper, not only the resistance but also the impedance and current densities are obtained and a method is provided of finding the impedance, etc., of a slotted conductor of any shape.

Another method is put forward for obtaining the impedance and losses in an isolated hollow cylindrical conductor consisting of a number of tubes having different magnetic and/or conductive properties. New functions are introduced and plotted (e.g., "coshinj θ" and "sinhinj θ") in order to simplify calculations.

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

Laurence, Scott & Electromotors, Ltd., report a trading profit for 1945, including £31,500 estimated E.P.T. recoverable, of £130,306. This compares with £139,311 for 1944, after provision for E.P.T. The net profit was £104,266 (£110,032). A sum of £6,600 is applied to capital redemption reserve, £47,000 (£56,000) as provision for income tax, £7,500 (same) for pensions, etc., and £10,600 (same) for other reserves. The dividend on the "A" and "B" ordinary shares is unchanged at 12½ per cent and £8,051 (£7,029) is carried forward.

Babcock & Wilcox, Ltd., propose to pay a final dividend on the ordinary stock of 6 per cent, making 10 per cent for the year (same) and a cash bonus of 2½ per cent (2 per cent). A preliminary statement shows that the profit for 1945, before taxation, amounted to £749,956 to which is added £33,879 E.P.T. refund in respect of the previous year. A sum of £100,000 is provided for deferred repairs and in addition special dividends (net) from subsidiary companies paid out of profits of previous years amount to £172,940, and £175,000 is transferred to general reserve. For 1944 the profit was £734,214, plus refund on E.P.T. of £28,776; a sum of £25,000 was provided for a possible fall in the value of stock of merchandise and £62,000 for deferred repairs.

Isle of Thanet Electric Supply Co., Ltd.—The accounts for 1945 show a total revenue, together with interest received, of £109,552 (against £78,590 for 1944). The gross profit was £51,986 (£34,995) and after meeting debenture interest, sinking fund, etc., there remained £28,929 (£13,806). From this is deducted a deficit of £22,066 (£35,872) brought forward, leaving a credit balance of £6,863. The directors have decided to pay a dividend on the 6 per cent participating preference stock for the year ending March 31st, 1941; this requires £9,306 net.

The British Electric Traction Co., Ltd., in its accounts for the year ended March 31st last, shows a revenue of £795,422 (against £779,608 for 1944-45). After providing £316,350 (£317,791) for income tax the net revenue was £337,562 (£323,737). The directors recommend payment of the following final dividends: 5 per cent on the 6 per cent cumulative participating preference stock, making 8 per cent for the year (same), and 30 per cent on the deferred ordinary stock, making 45 per cent (same). To mark the company's golden jubilee a bonus of 10 per cent is in addition being paid on the deferred ordinary stock. This leaves £17,491 (£62,110) to be transferred to undivided profits account.

Automatic Telephone & Electric Co., Ltd.—The accounts for 1945, which include consolidated figures for the first time, show a trading profit of the company and ten subsidiaries of £663,978, as compared with £544,493 for the preceding year. Of this E.P.T. takes £319,793 (£201,735). The trading profit of the parent company, after adjustment of provision for contingencies, amounted to £630,815 (against £482,646) before deducting £320,057 (£203,440) for E.P.T. The group's charge for British income tax was £11,240 (£24,238) greater than that of the parent company, and undistributed profits of subsidiaries amounted to £10,647 (£21,342), the parent company's net profit being £260,074 (£226,678). As already reported, the ordinary and deferred dividends for the year remain at 10 per cent plus a bonus of 2½ per cent.

Referring to the suggested British Commonwealth Telecommunications Research Association, the chairman (Sir Alexander Roger) states that the company cannot wait until such a body is formed, and has set up another research department. Although now well advanced towards reconversion, many months must pass before the company's plans take full shape. Some delays must arise in meeting arrears of telephone demand consequent on the war.

Benham & Sons, Ltd.—The chairman (Mr. W. L. Clarke) stated at the annual meeting that at no time, in years of peace, had they so many large contracts for cooking equipment in hand and never had their planning and estimating departments been so busy. The heating department had some very good orders and could do more if the material were available. The ventilating department had extended its activities to ships' work, and the electrical, utensil, repairs, etc., section had more orders than ever. The service department had been reopened, and they had also reopened and expanded the export side of their business with encouraging results. Orders included complete kitchen equipments for a number of canteens in Abadan and for several hospitals in Burma and Trinidad. As well as kitchen equipment they had excellent export orders for electric radiators, elements, etc.

Heatrae, Ltd.—The net profit for the year ended February 28th last was £13,959 (compared with £15,912 for the preceding year) to which is added £5,000 from stock reserve no longer required. A sum of £6,050 is applied in reduction of the book value of goodwill, and plant and machinery, and £5,303 is transferred to reserves. The ordinary dividend is unchanged at 12½ per cent and £7,356 (£7,500) is carried forward.

The Sphere Investment Trust, Ltd.—The accounts for the year ended March 31st show that gross revenue received amounted to £131,388, an increase of £12,421. After providing for debenture interest and expenses, there was a balance of £49,781 (against £43,415); to this is added £73,242 brought forward, making £123,023 available. It is proposed to pay a dividend of 5 per cent (same) on the ordinary shares, carrying forward £77,623.

Ransomes, Sims & Jefferies, Ltd., report a net profit for 1945, after providing for E.P.T. and income tax, of £57,534 (against £43,116 for 1944). As already stated, the ordinary dividend is again 7½ per cent. A sum of £15,000 (same) goes to pensions, £15,000 (nil) to general reserve, and £64,133 (£62,724) is carried forward.

Allen West & Co., Ltd., report a trading profit for the year ended January 31st of £67,445

(against £102,281). After crediting £16,000 estimated E.P.T. refund the net profit was £47,771 (£50,197). The dividend is again 7½ per cent, £15,000 (same) is set aside for general reserve and £56,947 (£60,738) is carried forward.

Enfield Cables, Ltd., is paying a final ordinary dividend of 6¼ per cent, again making 12½ per cent for the year. The net profit for 1945, after tax, was £115,034, compared with £115,894 for the preceding year.

Enfield Rolling Mills, Ltd., has declared a first and final dividend of 5 per cent (same).

Ransomes & Rapier, Ltd., are again recommending a final dividend of 4 per cent tax free, making 6 per cent free of tax for the year (same).

Radio Rentals, Ltd., announces an interim dividend of 7½ per cent (against 5 per cent last year).

Tecalemit, Ltd., has declared an interim dividend of 6 per cent (same).

Jenson & Nicholson, Ltd., are again paying an ordinary dividend of 25 per cent.

Glenfield & Kennedy, Ltd., are to pay a final dividend of 5 per cent and a bonus of 10 per cent, again making 20 per cent for the year. For the year ended March 3rd, the net profit, after taxation, was £63,950 (£59,684).

The Associated Equipment Co., Ltd., is to pay an interim dividend of 6d. per £1 unit of stock, tax free (same).

John I. Thornycroft & Co., Ltd., propose to pay an unchanged interim ordinary dividend of 5 per cent.

New Companies

Philips Southport Works, Ltd.—Private company. Registered April 29th. Capital, £1,000. Objects: To carry on the business of manufacturers of, and dealers in, radio valves and apparatus, electric lamps, discharge tubes and signs, wireless, television, electrical and cinematograph apparatus, electrical household and domestic appliances, etc. Directors: F. A. Kloppert, 13, Darlaston Road, S.W.19 (managing director of Philips Blackburn Works, Ltd.) and C. F. Cogswell, 40, The Knowle, Hayes, Kent. Secretary: C. F. Cogswell. Registered office: Spencer House, South Place, E.C.2.

B.V.C. Industries (N.I.), Ltd.—Private company. Registered in Belfast April 24th. Capital, £50,000. Objects: To carry on the business of manufacturers of, and dealers in, all kinds of electrical, mechanical, domestic and scientific apparatus, electric meters, vacuum cleaners, household appliances, etc. Directors: J. J. Hambridge, Homefield, Leatherhead, Surrey, and D. Watkins, 107, Mostyn Road, London, S.W.1. Registered office: 38, Ann Street, Belfast.

University Electrics, Ltd.—Private company. Registered April 18th. Capital, £1,000. Objects: To carry on the business of electricians, electrical, wireless, mechanical and atomic and nuclear energy engineers. Directors: G. Bradstock, Yokehurst, South Chailey, Lewes, and three others. Registered office: 7, Hertford Street, W.1.

Moat (Electrical Wholesalers), Ltd.—Private company. Registered April 24th. Capital, £10,000. Objects: To carry on the business of manufacturers of, and wholesalers and retail dealers in, and agents for, domestic, household and general electrical and other equipment, etc. Directors: H. Moat, 13, Burton Crescent, Leeds, 8, and three others (all directors of Moat (Builders' Merchants), Ltd. Registered office: 99, Harehills Avenue, Leeds, 8.

Zenolume, Ltd.—Private company. Registered April 18th. Capital, £1,000. Objects: To carry on the business of scientific glassware manufacturers, manufacturers of, and dealers in, high-vacuum tubes, neon and luminous tubes and signs, electric lighting lamps and fittings, radio valves and apparatus, etc. Directors: E. H. Moore, 38, Dryden Road, Harrow Weald, and two others. Registered office: 11a, and 12, Union Court, Old Broad Street, E.C.2.

Increases of Capital

Electric Panels, Ltd.—The nominal capital has been increased by the addition of £40,000, in £1 ordinary shares, beyond the registered capital of £10,000. At March 28, 1945, British Insulated Cables, Ltd., held 9,994 shares of £1 out of 10,000 issued.

Mortgages and Charges

S. W. Bligh, Ltd.—Mortgage on 1 and 2, North Lane, Canterbury, dated February 26th, 1946, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Collingwoods Distributors, Ltd.—Two land registry charges on (1) 42, 44 and 46, Princelet Street and 86 and 86a, Brick Lane, Stepney, E, and (2) 5, 7 and 9, Heneage Street, Stepney, both dated March 11th, 1946, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Fleet Electrics, Ltd.—Particulars filed of £9,000 debentures authorized March 1st, 1946, charged on the company's undertaking and property, present and future, including uncalled capital, and ranking *pari passu* with existing charge dated September 9th, 1939, the whole amount being now issued.

W. Sanders & Co. (1915), Ltd.—Satisfaction in full on April 3rd, 1935, of debenture registered April 1st, 1933. (Notice filed March 15th, 1946.)

Bankruptcies

R. J. Thurlow, electrical engineer, carrying on business at 27, Fore Street, Ipswich, as "Electrical & Radio Repair Services."—First meeting May 17th at 13a, Great Colman Street, Ipswich. Public examination June 14th at the Shire Hall, Ipswich.

C. I. Bentley, carrying on business in partnership as "Traders' Electric Lighting Supply," at 9, Fish Street, Hull, electrical factor.—Last day for receiving proofs for dividend May 24th. Trustee, Mr. H. S. Bloomer, 8, Flottergate, Great Grimsby, Official Receiver.

H. Tidswell, carrying on business as "H. Tidswell & Co.," 11, Bazaar Street, Pendleton, Salford, electrical engineer.—Last day for receiving proofs for dividend May 25th. Trustee Mr. P. M. Milwood, 20, Byrom Street, Manchester, Official Receiver.

STOCKS AND SHARES

STOCK Exchange business remains active, and prices in most markets show a rising disposition. The very ambitious proposals formulated some days ago in connection with supplying London with underground systems of transport, led at first to a demand for home railway stocks. The stocks enjoyed a mild improvement, the full extent of which was not held. Gilt-edged issues continue strong in sympathy with the similar tendency shown by British Government and other first-grade securities. The manufacturing and equipment group is decidedly strong.

Cable and Wireless

Dealings in Cable & Wireless (Holding) stocks have favoured the preference rather than the ordinary. On the week, the prices are unchanged at 116½ and 103½. Since it is the ordinary which is calculated to come best out of a liquidation, the recent relatively larger rise in the preference implies a hardening of the odds in favour of a continuance of the company in business after the subsidiaries have passed to the State. Marconi Marines are 1s. better at 36s. 6d. on the maintenance of the dividend at 7½ per cent for the year. Cable & Wireless are indirectly interested through their holding of Marconi's Wireless Telegraph, which has a substantial investment in Marconi Marine. English Electric are negotiating with Cable & Wireless for the purchase of the latter's interest in Marconi's Wireless Telegraph. At 66s., English Electrics hold their previous substantial rise.

The Rising Tide

As already noted, the general disposition of prices has been in favour of holders. Associated Electrical Industries, 69s., British Aluminium 42s. and Henley's 31s., are all 2s. 6d. better. British Insulated Callender's are 6d. up at 49s. General Electrics have gained a further ⅛ at 5⅛. Crompton Parkinson at 37s. are up 3s. 6d. Johnson & Phillips at 88s. show a ⅛ advance. The annual report and accounts are a little later than usual in appearing, circumstances beyond the board's control having prevented the finalizing of the figures. Reyrolle at 78s. 9d., and Westinghouse Brake at 81s. 3d. are ⅛ higher. Switchgear & Cowans hardened to 27s. 6d., and Revo rose a florin to 56s.

Miscellaneous Movements

Anglo-American Telegraph preferred and deferred have hardened to 130½ and 32½ respectively. Anglo-Portuguese Telephones at 29s. 6d. are up 6d. Telephone Properties, 24s. 6d. and Telephone Rentals, 15s., have put on 1s. 6d. Electricity supply shares are quietly steady. Falls of 6d. to 31s. 6d. in British Power & Light and to 55s. 6d. in Electrical Finance are almost the only changes in the home group. Calcutta Electrics have lost 2s. 6d. at 58s. The boomlet in South African mining shares finds an echo in Victoria Falls ordinary which at 5⅛ are 6s. 3d. higher. Tokyo Electric sixes at 36½ have gone back a point.

Ever Ready

Ever Ready is a company which shows a consistent dividend record, maintained with the announcement of a final dividend of 25 per cent, making 40 per cent for the year. As already stated, a victory bonus of 5 per cent in cash, which is not returnable for income tax, is being paid from the profit on the sale of an investment in an associated company. The shares hold their rise at 52s. Allowing for both distributions in the price, the yield, on the dividend alone, comes to just under 4 per cent.

The Ever Ready Trust Co., Ltd., has declared a dividend of 10 per cent on the ordinary and deferred shares, being at the same rate as that of the last two years. But this time, in addition, there is to be a victory bonus of 2 per cent. The company's business is restricted to that of an investment trust; its holdings number 123. One of the most considerable of these is in the Ever Ready Company, but iron, coal and steel, transport, mines and metal companies' shares figure in the list of investments. The issued capital is £250,000 in £1 ordinary shares and £50,000 in 500 deferred shares of £100 each. The former are quoted at 43s. 3d. middle.

New Radio Capital

Dealings began last week in the new ordinary 5s. shares of Ultra Electric (Holdings), offered recently to shareholders at 7s. 6d. in the proportion of one new for every eight shares held. They are changing hands at 2s. premium, the old shares being 9s. 6d. ex rights. On the 10 per cent dividend paid in each of the last three years, the yield works out to 5¼ per cent. The Pye Company, as mentioned last week, is proposing to increase its capital to £500,000 by the issue of 659,200 deferred shares of 5s. Present capital is £335,200, of which £150,000 is represented by 8 per cent preferred ordinary shares. The deferred are quoted at 44s. 6d., which gives a return of little more than 2¾ per cent on the 25 per cent dividend. The consistency with which that rate has been maintained since 1937-8 is unusual in the radio field.

Vacuum Cleaners

On the halving of the interim dividend to 6¼ per cent, the 5s. shares of British Vacuum Cleaner declined a further half-a-crown to 32s. 6d. Last year's total distribution was 30 per cent. Vactrics remain an active market and put on a further 1s. to 29s. The company has opened a factory in Adelaide, as stated in last week's *Electrical Review*. Hoover 5s. shares have attracted attention around 49s. since the chairman's statement at the inauguration of the Glasgow factory, the entire year's output of which has already been sold. For last year, the company paid a total of 30 per cent—an increase of 5 per cent on the previous year's distribution.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

BRITISH THOMSON-HOUSTON CO., LTD.—" Ice making apparatus." 7769/44. April 27th, 1943. (576924.)

British Thomson-Houston Co., Ltd., and M.S. Molsher.—" Fastening devices for removable covers." 14765. August 2nd, 1944. (576934.)

British Thomson-Houston Co., Ltd., S. C. MacDiarmid and J. N. Hull.—" Electric lighting fittings." 9433. May 17th, 1944. (576868.)

Callenders-Suchy Developments, Ltd., and C. T. Suchy.—" Electro-deposition of metal on non-conductive material." 9564. May 18th, 1944. (576875.)

J. A. Crabtree & Co., Ltd., B. G. Harrison and R. W. Morgan.—" Wall boxes and junction boxes for use in connection with electrical wiring conduits." 7008. April 15th, 1944. (Addition to 500048.) (576919.)

J. Crawford.—" Carriers for electric fuses, links and similar connections." 9450. May 17th, 1944. (576870.)

Dorman & Smith, Ltd., and J. Lund.—" Electrical fuse carriers or holders." 22962. November 18th, 1944. (576854.)

H. M. Dowsett.—" Wireless beam systems." 10295. June 13th, 1940. (576825.) " Production of beams of short-wave electromagnetic radiation." 11267. July 5th, 1940. (576826.) " Electromagnetic beam receiving aerial devices." 10744. August 22nd, 1941. (576828.) " Directive wireless systems." 14509. September 24th, 1940. (576941.)

L. H. Drysdale and M. Squires.—" Electrical signalling systems." 18522. November 8th, 1943. (576845.)

Electro Methods, Ltd., and H. L. Schuster.—" Electromagnetic relays." 9233. May 15th, 1944. (576861.)

English Electric Co., Ltd., and J. A. F. Harvey.—" Means for operating trip-free electric circuit breakers." 9478. May 17th, 1944. (576872.)

General Electric Co., Ltd., and F. H. Morris.—" Paint-drying and like apparatus." 5521. April 24th, 1942. (576829.)

Igranic Electric Co., Ltd.—" Electric snap action circuit controlling devices." 10925/44. June 7th, 1943. (576929.)

Induction Heating Corporation.—" Induction heating work coils." 9382/44. June 24th, 1943. (576865.)

C. Leach and Dowsing Co. (Electrical Manufacturers), Ltd.—" Means for hair drying." 19550. July 5th, 1939. (576823.)

M-O Valve Co., Ltd., and C. W. Cosgrove.—" Electric discharge devices." 3359. February 23rd, 1944. (576883.)

D. Nield.—" Vacuum cleaners." 5747. March 29th, 1944. (576851.)

F. T. Powers.—" X-ray radiography." 19090/43. November 24th, 1942. (576846.)

Pressed Steel Co., Ltd., W. G. Nolcken and A. O. Brandon.—" Refrigerating systems." 7492. April 22nd, 1944. (576921.)

Revo Electric Co., Ltd., and A. E. Felton.—" Tubular fluorescent lamp fittings." 7853. April 27th, 1944. (576852.)

Simms Motor Units, Ltd., and W. Bryan.—" High tension electrical ignition devices for internal-combustion engines." 500. March 17th, 1944. (576850.)

Standard Telephones & Cables, Ltd.—" Devices for measuring electrical impedances." 10233/44. June 8th, 1943. (576903.)

Standard Telephones & Cables, Ltd., E. M. S. McWhirter, R. H. Dunn, C. H. Chambers, F. W. Warden and S. S. Hill.—" Electric signalling systems." 3989. March 3rd, 1944. (576948.)

A. H. Stevens (Kellogg Switchboard & Supply Co.).—" Switching systems and apparatus." 10793. July 2nd, 1943. (576834.)

Varley Dry Accumulators, Ltd., and H. D. Lark.—" Terminal connections of secondary batteries." 9399. May 16th, 1944. (576866.)

Reports on German Industry

FURTHER reports of the British Intelligence Objectives Sub-Committee (B.I.O.S.) and the Combined Intelligence Objectives Sub-Committee (C.I.O.S.) on German industry include:—B.I.O.S. 153: " Miscellaneous German Radio and Communication Targets " (1s. 6d.). B.I.O.S. 201: " Visit to C. H. F. Müller A.G., Röntgen. str. 24, Bahrenfeld, Hamburg: Radio Development " (6d.). B.I.O.S. 205: " The K.W.I. für Eisen Forschung, Düsseldorf: The Use of X-rays in Stress Measurement " (1s.). B.I.O.S. 207: " The ' Magnetophon ' of A.E.G., 150, Hohenzollern Damm, Berlin/Grunewald: Magnetic Tape Recorder " (1s.). B.I.O.S. 212: " Ultra-sonic Research and Development in X-ray Equipment: Siemens-Reiniger Werke A.G., Erlangen " (6d.). B.I.O.S. 275: " Food Preservation with special reference to the applications of Refrigeration " (13s. 6d.). B.I.O.S. 363: " Rohm und Haas A.G., Darmstadt: Manufacture of ' Plexiglas ' and ' Plexigum.' Polymerization of Methyl Methacrylate " (4s.). B.I.O.S. 307, " German Secondary Batteries, with special reference to those used by Army Signals " (2s.). B.I.O.S. 317, " German Glass Manufacture as applied to Illumination, with special reference to Aviation Lighting " (4s. 6d.) B.I.O.S. 336. " Investigation of Steam Generating Plants and Boiler Practice in Central Germany " (12s. 6d.). C.I.O.S. XVI—4, 5, 8, " Belgian Plastics Industry " (2s. 6d). C.I.O.S. XXXII-95, " Telefunken Cathode-ray Tube Laboratories and Leuchtstoffe, Phosphor Manufacture" (3s). F.I.A.T. 104, " Survey of the Arc Carbon Industry in Germany " (1s. 6d). B.I.O.S. 342, " German Wartime Electricity Supply, Conditions, Development, Trends " (12s). B.I.O.S. 203, " Non-Destructive Testing of Materials and X-ray Protection Methods " (1s). B.I.O.S. 314, " German Electricity Supply System (7s. 6d).

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Aberdeen.—Corporation Education Committee. Lighting and heating installations in Causeway-end Primary School; J. A. O. Allan, Ross & Allan, architects, 10, Bon-Accord Square.

Atherton.—May 31st. U.D.C. Cables and transformers. (May 3rd.)

Ealing.—May 20th. Electricity Department. 1,000-kVA and 7,500-kVA transformers and 11-kV switchgear. (May 3rd.)

Town Council. May 27th. Electrical installation work for 238 houses. (May 10th.)

India.—June 28th. Madras Government Electricity Department. 15,000-kW turbo-alternator for Basin Bridge "B" power station. (May 3rd.)

Manchester.—June 3rd. Electricity Committee. 3,000 heat-resisting globes for street lanterns. (See this issue.)

New Mills.—May 31st. Electricity Department. Transformers. (May 10th.)

North Scotland.—May 20th. Hydro-Electric Board. 11-kV overhead lines, Loch Fannich area. (May 3rd.)

June 10th. High- and low-voltage overhead lines, Bute and South Cowal, and on the island of Lewis. (May 3rd.)

Reigate.—Town Council. May 31st. Wiring of 96 houses. (May 10th.)

Southend-on-Sea.—June 6th. Electricity Department. Transformers, switchgear and transformer kiosks. (See this issue.)

West Midlands.—June 14th. Joint Electricity Authority. Storage battery and charging equipment. (See this issue.)

Orders Placed

Ashton-under-Lyne.—Electricity Committee. Accepted. Switch panel in connection with modifications to No. 7 feeder panel at electricity works.—B.T.H. Co.

Cardiff.—Health Committee. Accepted. Radio equipment for Llandough Hospital (£270).—Edison Swan Electric Co.

Newcastle-on-Tyne.—City Council. Accepted. Switchgear for the Manors power station (£749).—J. G. Statter & Co.

Southport.—Electricity Committee. Accepted. Feeder pillars (£132 and £140 each).—British Insulated Callender's Cables.

Health Committee. Accepted. X-ray unit (£1,359).—Solus Electrical Co.

Swindon.—Town Council. Accepted. Supply of cable for stock purposes (three years' contract).—Standard Telephones & Cables.

Warrington.—Electricity Committee. Accepted. Transformers for twelve months.—Electric Construction Co. Electrically driven high-speed drilling, tapping and boring machine (£601), hydraulic hacksaw machine (£85), electrically driven grinding machine (£58), and electrically driven lathe (£579).—Buck & Hickman. Shaping machine, electrically-driven (£153), screwing machine, with motor (£104), and punching and shearing machine with motor and starter (£200).—Kerry's (Gt. Britain).

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—New primary and infants' school (£137,428); city architect.

Permanent houses (106); County Architect's Office, 22, Union Terrace, Aberdeen.

Alnwick.—Houses (100), for R.D.C.; G. Reavell & Cahill, architects.

Ashgate.—Hospital centre for Chesterfield and North Derbyshire Royal Hospital; Rees Phillips, architect.

Banstead (Surrey).—Permanent houses (36), Woodmansterne and Walton-on-the-Hill, for U.D.C.; F. H. Wiltshire, clerk, Council House, Brighton Road.

Beccles.—Houses (63), Ringbourne Hill (£72,923); Comben & Wakeling, Ltd., builders, 603, Kenton Road, Harrow.

Bellingham (Northumberland).—Houses (38), for R.D.C.; W. Dixon & Sons, Collingwood Street, Newcastle-on-Tyne.

Bexhill (Sussex).—Houses (54), Ingram's Farm; H. P. Storey, borough engineer.

Billingham-on-Tees.—Nylon factory for Imperial Chemical Industries, Ltd.; J. Gerrard & Sons, Ltd., contractors, Manchester.

Houses (74), Billingham Junction, for the U.D.C.; J. C. Watson, Ltd., builders, Prudential Buildings, Stockton-on-Tees.

Birkenhead.—Houses (42), Mount estate (first section); B. Robinson, borough engineer, Town Hall.

Bootle.—Extensions, Municipal Technical School, Balliol Road; W. W. Kenney & Co. (Builders), Ltd., Liverpool Road, Maghull, Liverpool.

Bromsgrove.—Extensive additions to brush works (£28,000); L. G. Harris & Co., Ltd., Stoke Prior Brush Works.

Bude-Stratton.—Conversion of old poor law institution, Stratton, into flats, for U.D.C.; T. H. Chambers, surveyor, 7, Belle Vue Avenue, Bude.

Carnforth.—Houses (78), for U.D.C.; C. Boak, builder, Crag Bank, Carnforth.

Croydon.—Rebuilding offices and warehouse, London Road, West Thornton; Kerry's (Great Britain), Ltd., Warton Road, High Street, Stratford, E.15.

Cudworth.—Houses (30), Newtown Avenue extension site; U.D.C. surveyor.

Cumberland. — Secondary schools, Cockermouth and Whitehaven; county architect, 4, Alfred Street North, Carlisle.

Durham.—Houses (200); city engineer.

Gateshead-on-Tyne.—Brewery, Salt Meadows; Federated Breweries, Ltd., Hanover Square, Newcastle-on-Tyne.

Glasgow. — Clothing factory, Milnbank; Collins Mantles, Ltd., Carlton Court, C.5.

Houses (4,000) for Scottish Special Housing Association; Corporation housing director.

Hartlepool.—Building 58 houses and completion of 35; borough engineer, Town Hall.

Horwich. — Houses (58), Old Lord's estate; G. & J. Seddon, Ltd., builders, 3, Manchester Road West, Little Hulton, near Bolton.

Inverness.—Houses (30), Portree, Skye; county clerk, County Buildings, Inverness.

Jarrow.—Brick and steel houses (50); borough engineer, Town Hall.

Kilmarnock.—Additional factory in Mill Street for Saxone Shoe Co., Ltd.; manager.

Buildings in Fore Street to be used as sawmill, etc. (£9,500) for Brownlee & Co., City Mills, Glasgow.

Liverpool.—Alterations to buildings for new works, Kirkby, for G. P. Dennis, Ltd., St. Michael's Street, Chester; L. H. Keay, architect, Blackburn Chambers, Dale Street.

London.—Hostels for casuals (£10,000) and depot extensions, Peckham (£60,700); L.C.C. architect.

Manchester.—Rebuilding damaged factory, Cheetwood Street, Cheetham, for E. Glasbery & Co., Ltd.; H. S. Fairhurst & Son, architects, Chancery Chambers, 55, Brown Street.

Rebuilding portion of damaged factory, Robert Street, Cheetham, for H. Saffer & Son, Ltd.; B. Pendleton, architect, 16, Brazennose Street.

Middlesbrough. — Houses (84), Thorntree estate; borough engineer.

Adaptation of "Claremont," Roman Road, as hospital, for the Durham County and Sunderland Eye Infirmary.

Morpeth.—Houses (106), Lynemouth, for R.D.C.; J. Urpeth, Front Street, Bedlington.

Newcastle-on-Tyne. — Electric lighting and heating installations for 565 houses; city architect, 18 Cloth Market.

Houses (26), Betts Avenue and Whickham View, for the City Council; R. S. Appleby & Co., Ltd., builders, Newcastle-on-Tyne.

Newton Stewart.—Houses (42), for Town Council; Alex. Young, architect, Millburn, Newton Stewart.

Northampton.—Rebuilding works after fire; H. Tomalin & Son, Ltd., dyers and cleaners, 17, Giles Street.

Northumberland.—Conversion of Kirkley Hall, Ponteland, to farm institute (£15,000); county architect, Newcastle-on-Tyne.

Perth.—Houses (26), Comrie; J. S. Dow, architect, 5, Charlotte Street, Perth.

Preston.—Houses (44), Cop Lane, Penwortham, for Rural District Council; I. Spencer & Sons, builders, Liverpool Road, Penwortham.

Stockport.—Rebuilding two-storey foundry, Carrington Street, Portwood, for J. Needham & Sons, Ltd.; D. Eadie & Co., Ltd., builders, Short Street, Heaton Norris.

Sunderland.—Houses (384), Thorney Close estate; L. W. Evans (Contractors), Ltd.

Houses (150), for key workers for new industries; J. E. Lewis, borough engineer.

Tynemouth.—Factory for British Die Castings Co., at Tynemouth Trading Estate; E. Jeffock, Ltd., Walbottle Road, Newburn-on-Tyne.

Waddon.—Office block, etc., Queensway; Field Consolidated Aircraft Services, Ltd., Queensway Works.

Wallasey.—School for 900 children at Moreton; R. F. B. Grundy, borough engineer, Town Hall.

Wallsend.—Works additions for the Thermal Syndicate Co., Ltd.; Couves & Partners, architects, Carliol House, Newcastle-on-Tyne.

Warminster.—Permanent houses (44), Upper Marsh Road; T. W. Snailum, Council's architect, Abbey Chambers, Bath.

Warrington.—Factory, Loushers Lane; Ferrous Light Castings, Ltd.

Units and Standards

UNITS and standards were discussed at a recent meeting at the Royal Society in London. Papers on the measurement of length, mass, temperature and electrical quantities were contributed by members of the staffs of the Department of Scientific and Industrial Research and the National Physical Laboratory. SIR CHARLES DARWIN, director of the N.P.L., presided and drew attention to the need for discriminating between accuracy of comparison and accuracy of realization.

DR. L. HARTSHORN (N.P.L.) dealt with electrical standards, describing methods of establishing theoretical units. Purely electrical comparisons of resistances, currents and potential differences could be made fairly readily with an accuracy of 1 part in 10^6, but realization of the corresponding units in terms of the fundamental quantities (mass, length, time) was a much more difficult task. In recent years it had become possible to establish the theoretical ohm and ampere of the electromagnetic system to about 1 part in 10^5; so the present specified units, which were defined in terms of a mercury column (ohm) and the silver voltmeter (ampere), would probably be superseded in the near future by the theoretical units. To establish the latter it was necessary to link the electrical with mechanical quantities through apparatus which would satisfy the theoretical conditions and permit both to be measured precisely. Work had been done at the N.P.L. with the Campbell standard of mutual inductance, the Ayrton-Jones current balance and the Lorenz apparatus, the accuracy of the results being largely dependent upon the construction and measurement of inductors of true geometrical form. Dr. Hartshorn described ways and means that had been evolved, drawing attention to such factors which needed further study.